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JUN 17 1985

Metro/T.T.C.

Downtown Rapid Transit Study

Report 2.02

ALTERNATIVE SOLUTIONS

Functional Design and Evaluation

TOR 388.40971 M25236

Toronto Transit Commission

March 1985

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Downtown
Rapid
Transit
Project

Metropolitan Planning Department
Metropolitan Roads & Traffic Department
Toronto Transit Commission

365 Bay Street, Suite 408
Toronto, Ontario M5H 2V1
947-8803

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March 22, 1985

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TO: The Metropolitan Toronto Technical Transportation Planning Committee

FROM: D. J. Morton

RE: Downtown Rapid Transit Study

At its meeting of June 21, 1983 the Council of Metropolitan Toronto, in adopting Clause No. 1 in Joint Report 1, of the Transportation Committee and the Economic Development and Planning Committee, approved the Terms of Reference for a Downtown Rapid Transit Feasibility Study.

The design for this Study provided for two separate phases. Phase 1 - Problem Definition - was completed in May 1984. Its findings are presented in DRT Report 2.01 - Problems and Issues to 2001.

Phase 2 - Solution Development - was recently completed and I am pleased to submit DRT Report 2.02 - Alternative Solutions (Functional Design and Evaluation), which documents the findings of this phase.

The alternative routes considered for the proposed Downtown Rapid Transit (Relief) Line are briefly described as follows:

Central Section (Spadina Avenue to Don River)

Queen Street (underground)
King Street via Queen (underground)
King Street via Front (underground)
Wellington-Front (underground)
Front (underground) - Railway (at-grade)
Front (elevated) - Railway (at-grade)
Railway Lands (elevated) - Railway (at-grade)

Eastern Section (Don River to Danforth Avenue)

Don Valley-Broadview (underground)
Eastern Avenue-Pape (underground)
Railway-Donlands (above grade)

Additionally, a proposal for an underground LRT system on Bay Street from Bloor Street to Front Street was fully evaluated against the above DRT alignment options.

The evaluation process identified a preferred alignment from Spadina Avenue and Front Street to the Danforth Subway line along the Front (underground) - Railway-Eastern-Pape route option. This recommended route is considered to best provide relief to existing and future overcrowding on the Yonge Subway line and accommodate forecast rapid transit travel demand into the downtown to the year 2001.

In addition, it is suggested that an alternative alignment along Wellington and Front Streets through the Central Section be retained at this point in time. This alternative alignment would be common with the recommended alignment east of the Don River.

In submitting this report, I wish to acknowledge the assistance of the Study participants from the Planning Branch and the Engineering and Construction Branch of the Toronto Transit Commission, the Metropolitan Toronto Planning Department, and the Metropolitan Toronto Roads and Traffic Department. Additionally, the assistance of the Metro Parks and Property Department has been greatly appreciated.

It is recommended that this report be circulated to the Area Municipalities of Metropolitan Toronto, the Government of Ontario and those Boards, Commissions and Public Corporations affected by transportation and land use matters, for their information.

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Project Manager

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DOWNTOWN RAPID TRANSIT REPORT NO. 2.02

ALTERNATIVE SOLUTIONS

FUNCTIONAL DESIGN AND EVALUATION

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SECTION 1 - PLANNING CONSIDERATIONS

In considering recommendations for a route and rapid transit facility into the downtown, the Study selected five criteria as key factors that would most influence the selection of an alignment for the proposed Downtown Rapid Transit line:

1. Transit Service
2. Long Term Policy Compliance
3. Economics
4. Environmental Impact
5. Implementation Issues.

Transit Service

Improvements in transit service offered by the new line will be measured largely by its ability to provide relief from overcrowding on the existing subway lines into the Central Area, and by improvements in accessibility to existing and proposed office space through the provision of additional transit, and reduction in crowding and delays to existing and future users. This is the essential purpose and justification for considering further investment in transit into the downtown.

Overcrowding is already being experienced on the Yonge Subway and at the Yonge-Bloor transfer station. Future overcrowding is forecast for the University Subway, the Bloor Subway, the Danforth Subway, and the St. George transfer station. The ability of the alternatives to relieve the overcrowding was tested by estimating the number of trips that would be diverted from the existing subway and onto the proposed new facility on the basis of existing travel patterns. This errs somewhat as a future indicator by assuming that the present distribution of place of residence and place of work will remain unchanged in the future. Insofar as there is a trend towards more office development on the south edge of the Financial District, any error in this indicator would be towards a slight understatement of the benefits of an alignment along the south edge of the Financial District, and overstatement of benefits for an alignment along the north edge.

This trend towards the south is seen in recent developments such as the Royal Bank Plaza, University Place, the Convention Centre and the IBM Tower on Wellington. Major proposals, such as the CBC project at Front and Simcoe, the Bell Canada project at Front and Bay and the Railway Lands proposal, reinforce this trend. When future development proposals for office space in the Central Core are totalled, approximately one half of these proposals are located south of Front Street, reflecting in particular the development potential of the Railway Lands. This trend towards a southerly extension of the Financial District is strongly supported by planning policies of the City of Toronto.

Because of this trend, and the support for it in policies of the City of Toronto, this report gives equal importance to office employment locations north and south of Front Street. This may appear to give undue consideration to future development sites at the expense of existing office space. However, any decision on a new Rapid Transit facility into the downtown must recognize these development trends and planning policies, and the need to improve accessibility to these sites if the development policies are to be realized. It must also be recognized that development in the northerly section of the Financial District is already well served by rapid transit stations located on the Yonge and University Subway, and will continue to be well served provided sufficient diversion can be achieved to ensure a satisfactory level of service on the existing subway.

Long Term Policy Compliance

Policies and long term objectives of Metropolitan Toronto, the City of Toronto, Borough of East York and the Toronto Transit Commission were considered in testing the alternatives against long term policy compliance.

The policies of the Councils of Metropolitan Toronto and the City of Toronto are set out in Official Plans for each of these municipalities. In the case of Borough of East York, the Official Plan is currently being drafted, and the draft plan dated October 1984 was referred to for policy statements. The policies of the Toronto Transit Commission are set out in the TTC's Long Range Plan issued in 1983.

Economics

The economic analysis considered capital costs and operating costs. Capital costs were prepared in 1984 dollars and include the cost of constructing the line, the cost of acquiring property, and the cost of the initial order of rolling stock. It was considered that the total number of transit trips into the downtown and the operating revenue would be very little affected by the choice of alignment, and therefore revenue was not used in ranking the alignment alternatives.

Environmental Impact

Environmental considerations include the natural, social and cultural environments that may be affected by the proposed transit line. A Downtown Rapid Transit line would be located in a fully urbanized setting with the effect that the social impacts, such as community, housing and development pressures, are of more significance in selecting an alignment than natural environmental factors. The Study considers the impacts of the alternative alignments on all categories of the environment defined under the Environmental Assessment Act, but places greatest significance on the impact of alternative alignments on downtown housing and downtown development pressures.

Implementation Issues

The alternative alignments are tested for their relative ease or difficulty of implementation following project approval. The foremost consideration in implementation is the availability of right-of-way. A significant right-of-way consideration for a Downtown Rapid Transit line, is the terms of availability of property for alignments within lands owned or controlled by the Toronto Terminals Railway and Canadian National Railway.

Other factors considered include general public nuisance and inconvenience during construction; traffic disruptions and the dependency of the project on undertakings by other authorities and utilities. Public nuisance and inconvenience in the downtown is measured largely by the number of public institutions and shopping activities located along the route. Construction activities in front of the Royal

Alexandra Theatre, the Convention Centre or the Eaton Centre for example, may be perceived to cause greater inconvenience to the general public than similar activities in front of the Toronto-Dominion Centre or the Royal Bank Plaza.

In considering downtown alignment options traffic disruptions will vary considerably depending upon the amount of transit traffic on the street, the number of private access points, and whether the street accommodates one or two-way traffic.

Implementation of any alignment for rapid transit through the railway lands is fully dependent on clearance of the property by the railways, and approval of development agreements and right-of-way dedication fully outside the authority of Metro, and therefore, highly sensitive to undertakings and commitments of third parties.

SECTION 2 - DESCRIPTION OF THE OPTIONS

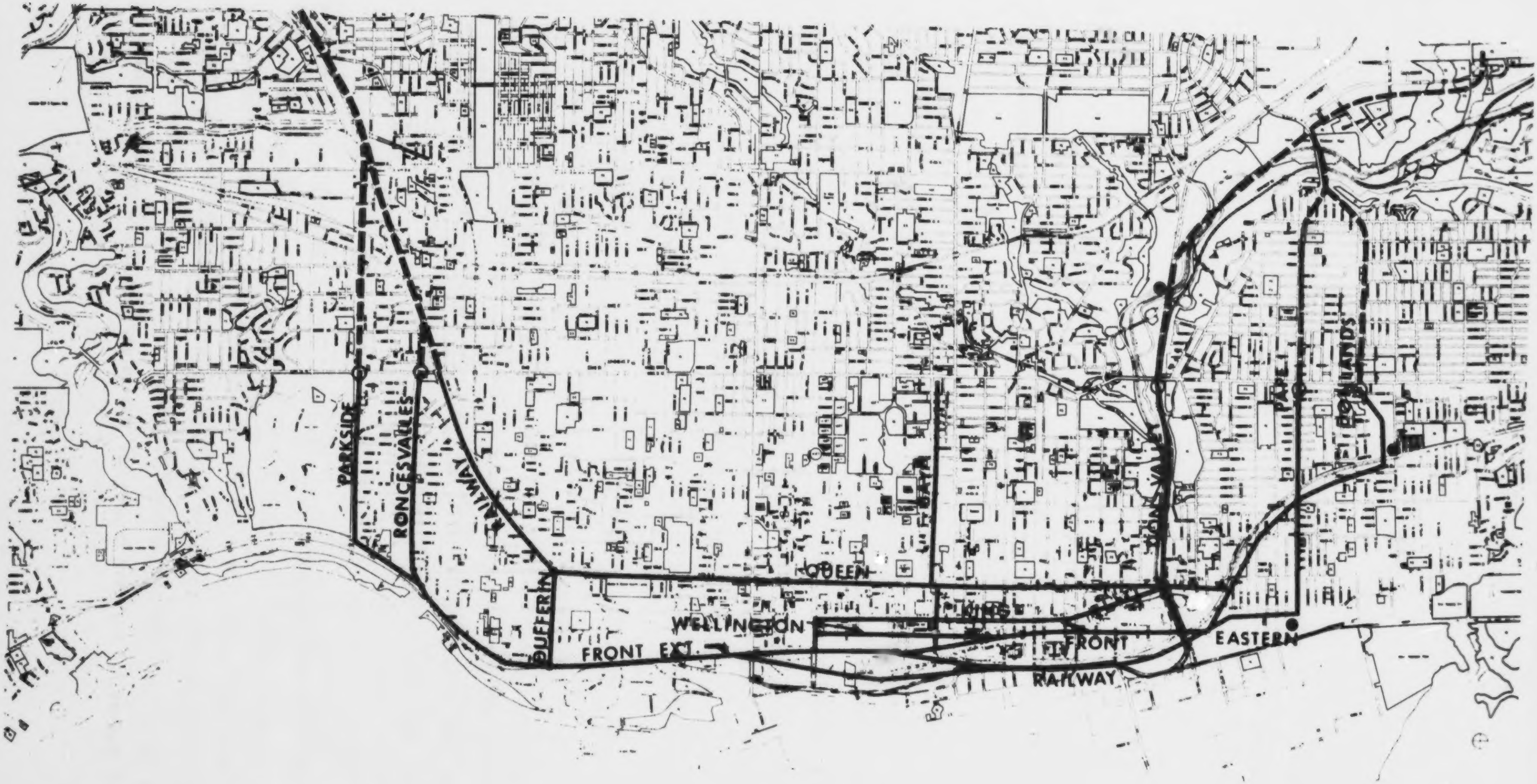
This report examines alternative rapid transit solutions for meeting the service requirements for transit into downtown Toronto over the next decade and beyond. The reader should note that alternatives to rapid transit, such as improved surface transit, more frequent subway trains, and enhanced GO Rail, were discussed in Report 2.01 - Problems and Issues to 2001, May 1984. Report 2.01 drew the general conclusion that these alternatives offer short term and possibly intermediate time frame relief from congestion on the subway system, but that a long term solution for downtown must include a rapid transit line connecting the Danforth Subway to downtown. For a more detailed discussion the reader should refer to Downtown Rapid Transit Study Report 2.01.

In examining rapid transit alternatives into the downtown a number of alternatives have been considered. These are shown on Exhibit 2.1. For ease of discussion the alignments are referred to in the report in terms of three separate sections:

Central Section - from Spadina Avenue to the Don River,
Eastern Section - from the Don River to the Danforth Subway, and
Western Section - from the Bloor Subway to Spadina Avenue

During the course of the Study alternative alignments in these sections were developed on city mapping, and evaluated on the basis of transit service improvements, long term policy compliance, costs, environmental impact and ease of implementation.

Alignments north of the Bloor-Danforth to Eglinton Avenue were mapped and tested in a limited manner to assure that there are reasonable opportunities for a future extension to any service implemented at this time.


PARKSIDE
RONCESVALLES
RAILWAY
DUFFERIN
QUEEN
WELLINGTON
FRONT EXT.
BAY
KING
FRONT
RAILWAY
DON VALLEY
PAPE
DONLANDS
EASTERN
● ASSOCIATED DRT YARD SITES
POSSIBLE EXTENSIONS NORTH OF BLOOR-DANFORTH
LOWER U DRT OPTIONS

D.R.T. ALIGNMENT OPTIONS
EXHIBIT 2.1

The Central Section

Exhibit 2.2 shows the six different routes evaluated in the Study for rapid transit service into the Central Core. The alternatives tested include consideration of rapid transit service on five east-west routes; Queen, King, Wellington, Front and the Railway Corridor; and a north-south light rail transit service on Bay Street.

The east-west alignments are located to form the downtown section of a U-shaped rapid transit line connecting the Danforth Subway to the Bloor Subway via the downtown. The Bay Street LRT alignment is a northerly extension of the proposed Harbourfront LRT service.

QUEEN STREET

This is an underground alignment from Spadina Avenue east to about River Street where the line surfaces onto a new bridge crossing over the Don Valley. On the east side of the Don Valley, the line again goes underground until the CN rail corridor is reached. The crossing of the Don Valley requires that the existing Queen Street bridge be twinned with a new rapid transit bridge to the south. Underground stations are proposed at Spadina, University, Yonge and Sherbourne. The alignment would pass under the Yonge and University Subways.

KING STREET

This is an underground alignment from Spadina Avenue east to Berkeley Street where two options exist. East of Berkeley the line may continue along King Street to about River Street where it becomes common with the Queen Street option, surfacing onto a new bridge over the Don Valley; or the line can be routed to Parliament and Front where it becomes common with the Wellington Street alignment.

At the Spadina end of this alignment it is proposed that the line be routed south along Spadina Avenue to Front Street where it would continue westerly. This permits a station located on Spadina Avenue with entrances near Front Street to provide good access to the Spadina node of the Railway Lands Project. Underground stations are proposed at Spadina, University, Yonge and Sherbourne. The alignment would pass under the Yonge and over the University Subways.

WELLINGTON STREET

This is an underground alignment from Spadina Avenue east to Cherry Street where the line surfaces to continue on an elevated structure east of Cherry Street passing over the Don River and Kingston Subdivision of the CN. The line follows the south-east edge of the CN Corridor for about half a kilometre to Eastern Avenue. Underground stations are proposed at Spadina and University Avenues, and at Yonge and Sherbourne Streets. The alignment would pass over the University Subway and under the Yonge Subway.

FRONT STREET

Both elevated and underground options have been considered for a Front Street alignment. It was considered that the width of right-of-way could provide an opportunity for an elevated transit line along the street from Spadina Avenue to Bay Street where the alignment swings south and enters the Toronto Terminals Railway (TTR) Corridor.

The elevated option includes elevated stations at Spadina, the Convention Centre and Union Station. The underground option includes underground stations at these locations. Both options are routed along Front Street from Spadina Avenue to Bay Street where the line is routed south either in tunnel under the Dominion Public Building at the south-east corner of Bay and Front; or an elevated structure between the Dominion Public Building and Union Station.

After passing over or under the eastern railway approach tracks to Union Station the alignment continues along the south edge of the Railway Corridor at-grade between the Gardiner Expressway and the operating railway. The alignment is routed along the south edge of the operating railway right-of-way from just east of Bay Street to the Don River, with the top of rail at the same rail elevation as the railway. An at-grade station is proposed at Sherbourne Street.

RAILWAY CORRIDOR

This is an elevated alignment from Spadina Avenue east to Bay Street, following Esplanade West, a new road proposed through the railway lands as part of the Railway Lands Development Project. Elevated stations are located at Spadina and Union Station. The elevated structure follows the centre line of the proposed

Esplanade West right-of-way. East of Bay Street the alignment is similar to the Front option with a station proposed at Sherbourne.

BAY STREET

This proposal involves extension of the Harbourfront LRT north on Bay Street to Bay Station on the Bloor-Danforth Subway. The alignment would involve underground construction from Front Street to Bloor Street, with six underground stations located at King, Queen, Dundas, College, Wellesley and Bloor. The alignment would include an underground turning loop at Bay and Bloor and would pass under the existing subway at Front Street to connect to the proposed Harbourfront LRT, providing a continuous service to Queen's Quay.

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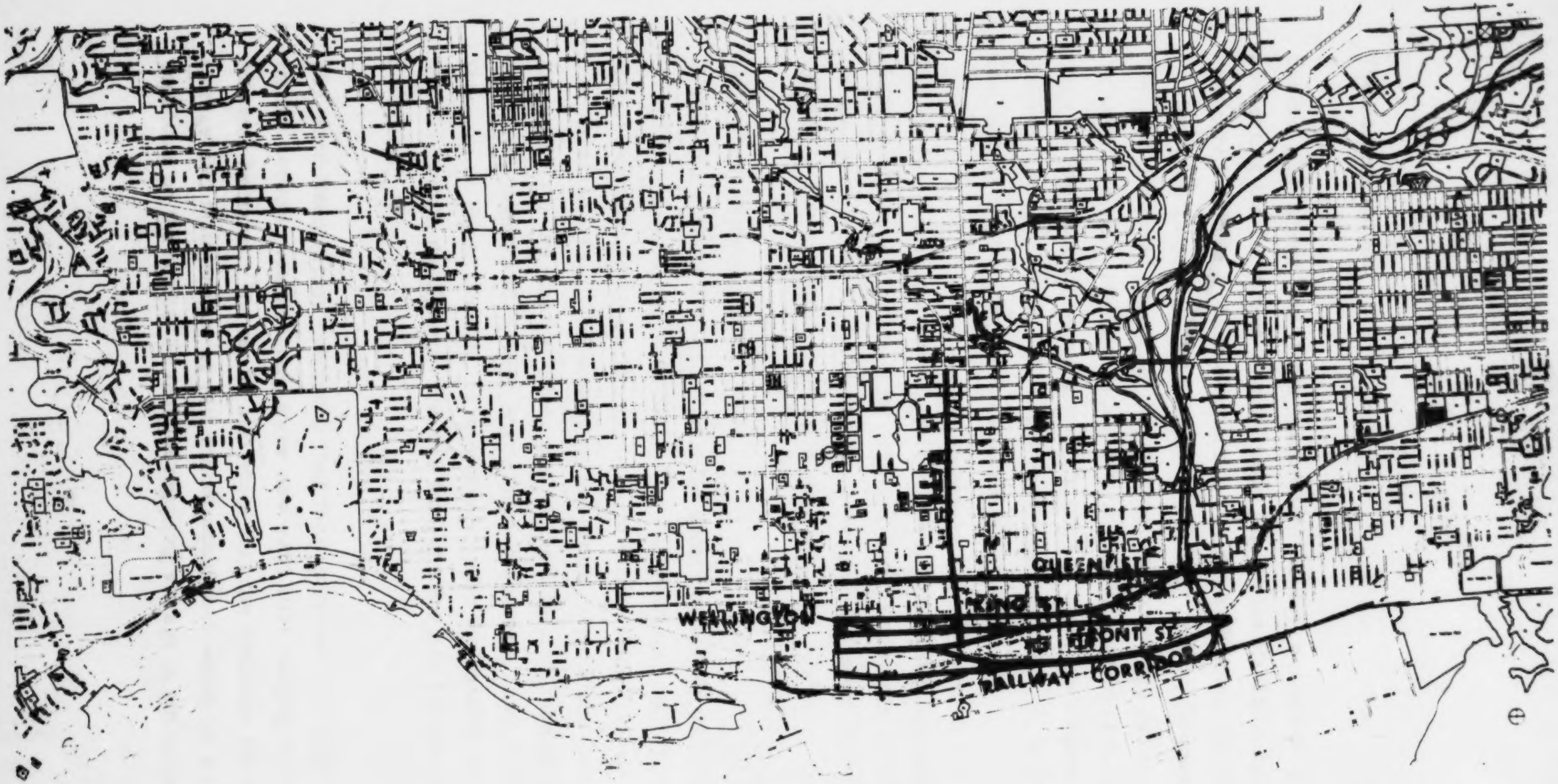

QUEEN ST.
KING ST.
WELLINGTON
FRONT ST.
RAILWAY CORRIDOR

CENTRAL SECTION OPTIONS
EXHIBIT 2.2

The Eastern Section

Exhibit 2.3 shows the three alternative routes evaluated in the Study for connecting the Downtown Rapid Transit line to the Danforth Subway. The Study considered making a possible connection at three different subway stations on the Danforth for transfer traffic between the Subway and the Downtown Rapid Transit line, and examined routes for the alternative connecting points. The alignments included a route in the Don Valley with a transfer station at Broadview Station; a route on Pape Avenue with a transfer station at Pape; and a route following the CN Railway Corridor to the TTC Greenwood maintenance yards, and then north to the Danforth with a transfer station at Donlands Station.

The planning for a Downtown Rapid Transit alignment is constrained by the need to establish a location for yards for servicing and maintenance of the trains operating on the line. The Study identified three possible sites shown on Exhibit 2.3 associated with the three alternative alignments.

YARD LOCATIONS

In 1983 the Toronto Transit Commission undertook a study of the railyard needs for the TTC through to the year 2001. The study assumed an expansion of the rapid transit facilities, that would include a Downtown Rapid Transit line and an east-west crosstown line. The downtown line would extend from the Bloor Subway in the west into the Central Area, and to the Danforth Subway in the east. The crosstown line would extend from the Scarborough Town Centre along either Sheppard or Finch westerly, to interconnect with the Spadina Subway, then extend westerly within the Eglinton corridor from the Spadina Subway to the West Metro Boundary.

The Yard Needs Study concluded that these proposed new lines to the TTC rapid transit network would require three new yard sites ranging in size from eight to fourteen hectares. The report also noted that the minimum practical yard site for storage and maintenance of rail transit equipment would be six to ten hectares, depending on the number of vehicles requiring storage in the railyard.

The study identified two possible yard sites for the Downtown Rapid Transit line. One of these sites involved the use of the existing yard area at Greenwood now being used for subway car storage and maintenance. The second site involved an eastern industrial waterfront area located on Lakeshore Boulevard East. Since the conclusion of this study, further discussions with the City of Toronto Works Department have noted that the site on Lakeshore Boulevard East is also a proposed location for a planned steam generating site to be operated by the City of Toronto. In view of the advanced planning of this steam generating facility, it was decided in the Downtown Rapid Transit Study to abandon further consideration of this site for the maintenance and storage of vehicles operating on the Downtown Rapid Transit Line. This left only the Greenwood site for consideration as a potential yard location for the maintenance and storage of a Downtown Rapid Transit vehicle fleet.

The use of the Greenwood site for a Downtown Rapid Transit line would necessitate a relocation of part of the Bloor-Danforth Subway fleet to a new yard site at Kipling and Dundas. The transfer of part of the Greenwood maintenance facilities is consistent with a long standing plan by the TTC that led to a 1971 purchase of property in the Kipling-Bloor area by Metro. A disadvantage of the Greenwood site in terms of the Downtown Rapid Transit facility, is that the site is reasonably accessible only from a Downtown Rapid Transit alignment connecting to the Donlands Station. For this reason the Study reviewed opportunities for alternative sites that would provide better accessibility for an alignment along Pape Avenue, or alternatively, an alignment within the Don Valley. This review of alternative sites identified a potential site located at Eastern and Pape Avenues, which would provide accessibility to an alignment on Pape; and also identified a site in the Don Valley located on the former site of Toronto Brick Yards near Pottery Road, which would provide accessibility to the alignment in the Don Valley.

DON VALLEY

This alignment was initially viewed as a least cost opportunity for a connection to the Danforth Subway. However, the number of transportation facilities already in the Valley, and the elevation of bridges crossing the Valley, forces an underground construction from south of Front Street to the Prince Edward Viaduct at the

Danforth. From Front Street to Gerrard the route is generally aligned below Bayview Avenue. North of Gerrard the line is routed to the east side of the Valley crossing in tunnel under the Don River and the Don Valley Parkway. Underground stations are proposed at Queen Street and at Danforth Avenue. The station at Danforth Avenue for transfer traffic to and from the Danforth Subway is situated about fifteen metres below the existing subway and requires extensive escalator facilities for a connection to the west end of the Broadview Station on the Danforth Subway.

The track and structure is extended approximately 1 kilometre north of the Danforth-Broadview Station to a yard site at the Toronto Brick Yards property.

PAPE

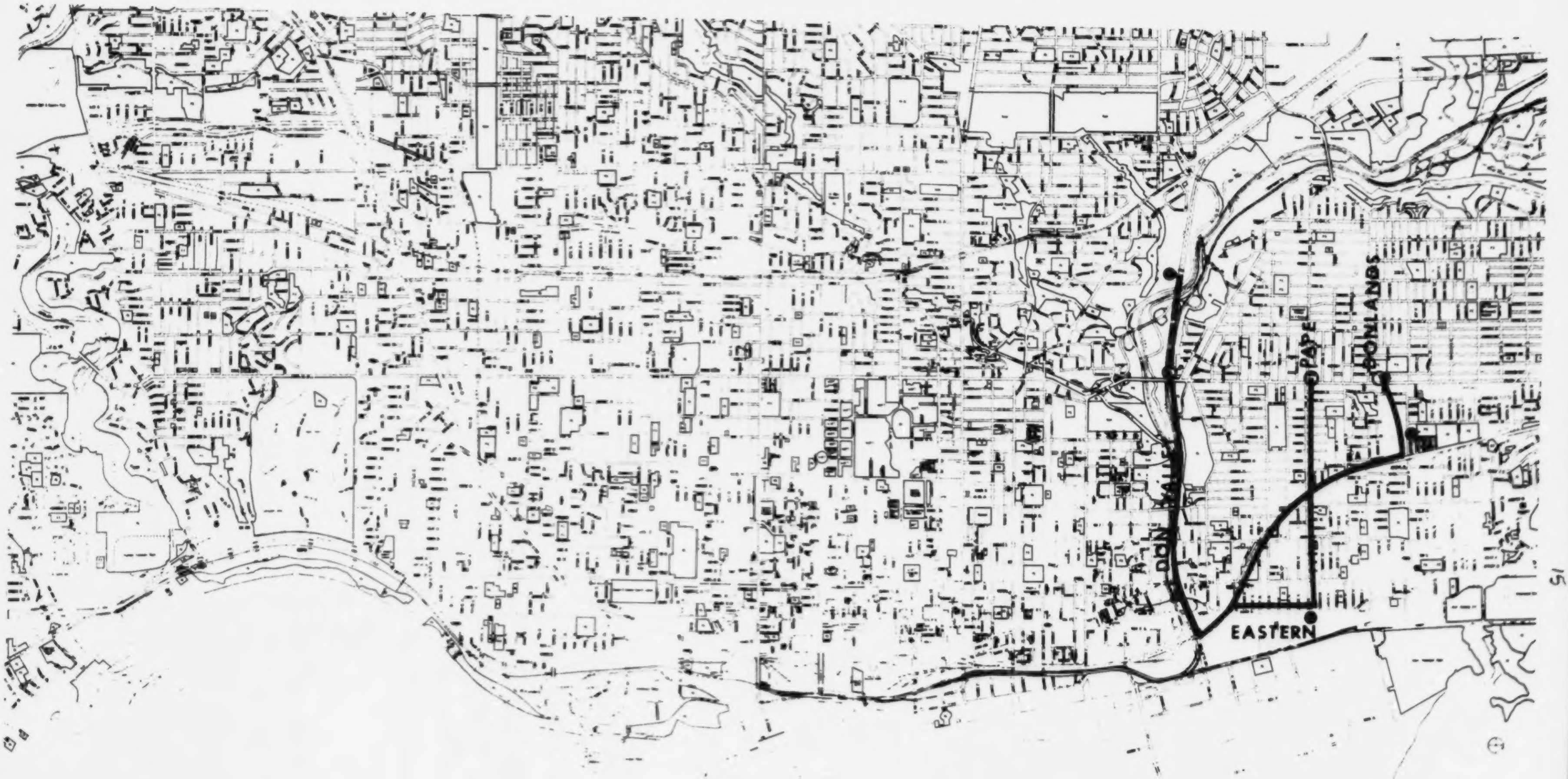
This is an underground alignment starting at the intersection of Eastern Avenue and the railway and continuing along Eastern Avenue to Pape Avenue where the line is routed northerly along Pape Avenue to the Danforth Subway. Both the east-west leg on Eastern Avenue and the north-south leg on Pape are located underground. The alignment proposes underground stations on Pape Avenue at Queen Street, Gerrard Street and Danforth Avenue. The alignment crosses above the Danforth Subway making a connection to the platform area of Pape Station.

DONLANDS

This alignment follows the CN Railway Corridors from the Don River to the TTC Greenwood Yards on a cantilever structure with a deck elevated over the operating railway right-of-way.

In this section of line, the railway right-of-way is restrictive, and in the Queen to Gerrard area has a minimum width of twenty-four metres. The CN has indicated in a review of Study drawings and in correspondence, that the ultimate railway requirements in the Kingston Subdivision is a right-of-way for up to five parallel tracks requiring a minimum width of twenty-four metres. These parallel track requirements would include VIA inter city passenger service, GO regional commuter service, CN freight service and local access tracks. These requirements, as set out by CN Rail, have been respected by the design proposed in the Study through the use of elevated structures with supporting piers placed the Study through the use of elevated structures with supporting piers placed outside the railway clearance line of twenty-four metres. A reduction in the CN Rail requirements to four parallel tracks would continue to require an elevated guideway, but would have eliminated the necessity to require private properties for pier and foundation structures for the elevated deck.

The elevated guideway follows the CN corridor to the TTC Greenwood Yards where it is routed north along the western edge of the TTC Yards property. The alignment is then underground from Oakvale Avenue to the Danforth Subway where a transfer station is located at the Donlands Subway Station. Elevated stations on the south side of the Railway Corridor are proposed at Queen Street and Gerrard Street. The transfer station at Pape and Danforth is underground, located below the Danforth Subway.


DON VALLEY
PAPE
DONLANDS
EASTERN

● ASSOCIATED DRT YARD SITES

EASTERN SECTION OPTIONS
EXHIBIT 2.3

The Western Section

Exhibit 2.4 shows the three alternative routes considered in the Study for the western leg of the Downtown Rapid Transit line connecting the downtown section to the Bloor Subway at Dundas West Station or Keele Station. The alignments include a route following the Galt-Weston Railway Corridor to the Bloor Subway at Dundas West Station; a route following the Oakville Railway Corridor along the Lakeshore to Roncesvalles where it turns north to connect to the Bloor Subway at Dundas West; and a variation of the Lakeshore alignment that continues in the Oakville Railway Corridor to Parkside where the line would be routed north to connect to the Bloor Subway at the Keele Station.

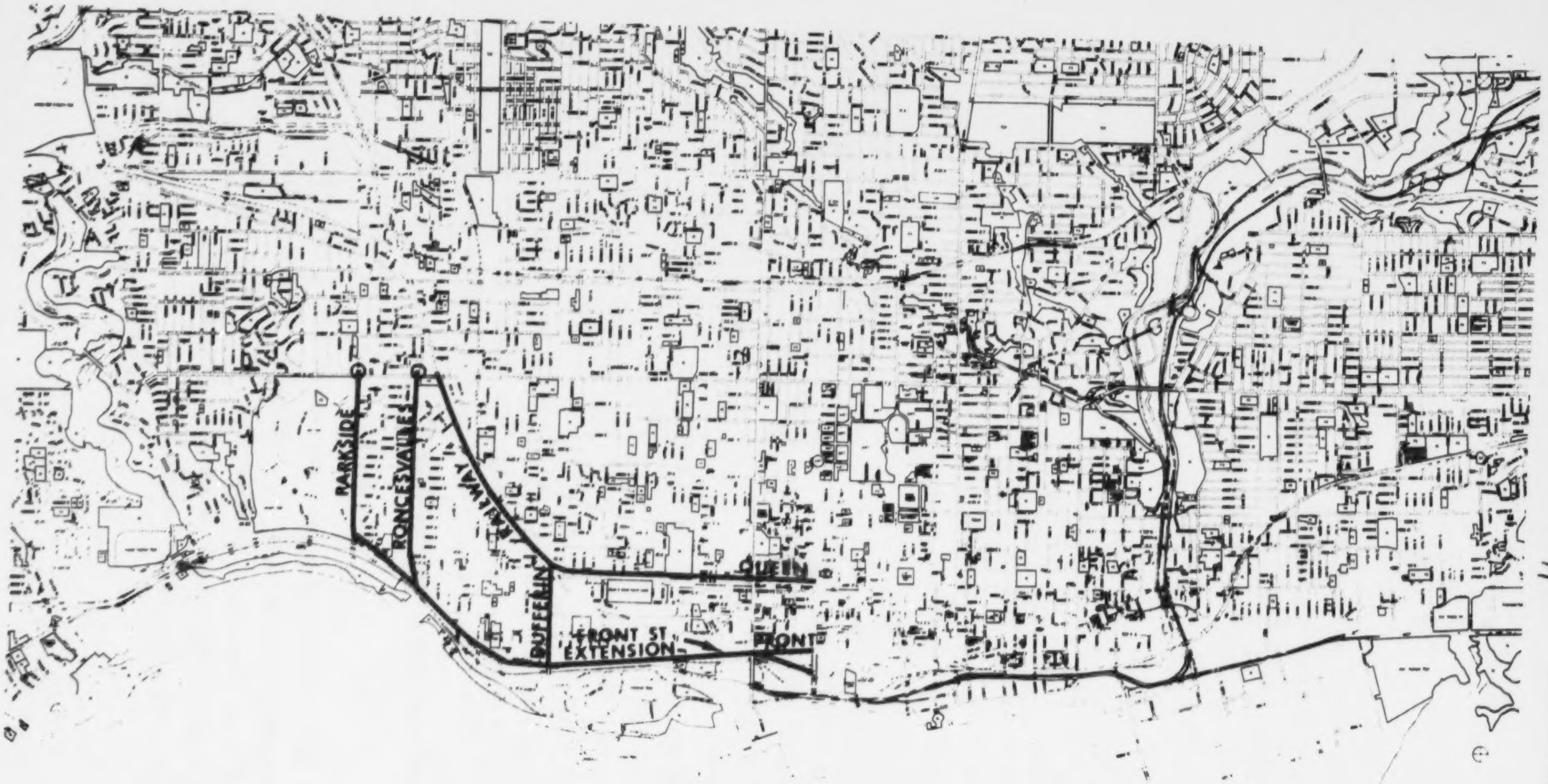
GALT-WESTON RAILWAY CORRIDOR

This option for connecting to the Bloor Subway involves two separate alignments between Spadina Avenue and Dufferin Street, depending upon the route selected for the Central Section.

The Queen Street option involves continuation of an underground alignment westerly along Queen Street to Dufferin with underground stations at Bathurst and Strachan.

A Central Section alignment along King, Wellington, Front or the Railway Corridor involves a continuation of the line westerly along Front Street to Bathurst. West of Bathurst, the May 1983 Metro/TTC Central Waterfront Transportation Study recommended an extension of Front Street to Strachan, and the alignment for the westerly section of the Downtown Rapid Transit line proposes to follow the same alignment between Bathurst and Strachan, on a guideway elevated over the Front Street roadway extension.

West of Strachan the alignment would continue along the north edge of the CN operating right-of-way of the Oakville Railway Corridor to Dufferin Street where the line turns north to meet the Galt-Weston Railway Corridor at Dufferin and Queen. This section from Spadina to Queen-Dufferin includes elevated stations at Bathurst and Exhibition Place, and an underground station on Dufferin Street at King Street.


PARKSIDE
RONCESVALLES
RAILWAY
DUFFERIN
QUEEN
FRONT ST EXTENSION
FRONT

WESTERN SECTION OPTIONS
EXHIBIT 2.4

The stretch in the Galt-Weston Railway Corridor between Queen-Dufferin and Bloor Street is located below grade in the railway right-of-way. The constraints of this railway right-of-way, the existing railway trackage including many industrial spurs that must be grade separated, and the future requirements of CN and CP preclude an at-grade alignment in this corridor. In grade separating from the railway and road traffic in the corridor, the Study developed an underground alignment for the Downtown Rapid Transit facility. In view of the lower priority being placed on the west leg of the DRT line, this was considered to be an adequate level of study at this time. However, the study concluded that further consideration of an elevated line in this corridor is required before a final route decision should be made. The Study proposes that stations (within the Railway Corridor) be located at Queen, Dundas and Bloor Streets.

RONCESVALLES

This alternative follows the same alignment from Spadina Avenue to Dufferin Street, along Front Street and the north edge of the CN Oakville Subdivision, as proposed for the Galt-Weston Subdivision alternative with elevated stations at Bathurst and Exhibition Place. West of Dufferin this alternative continues immediately to the north of the operating CN right-of-way to Roncesvalles where the line would turn north to connect to the Bloor Subway at the Dundas West Station. Between Dufferin and Roncesvalles the line would be at the same elevation as the existing railway, being built partially into the existing side slope and in part on property to the north of the railway property line. Due to the limited width of right-of-way on Roncesvalles, an underground alignment has been proposed from Queen Street north to Bloor Street. Stations are proposed for Jameson Avenue, Queen Street, Howard Park Avenue and Bloor Street.

PARKSIDE

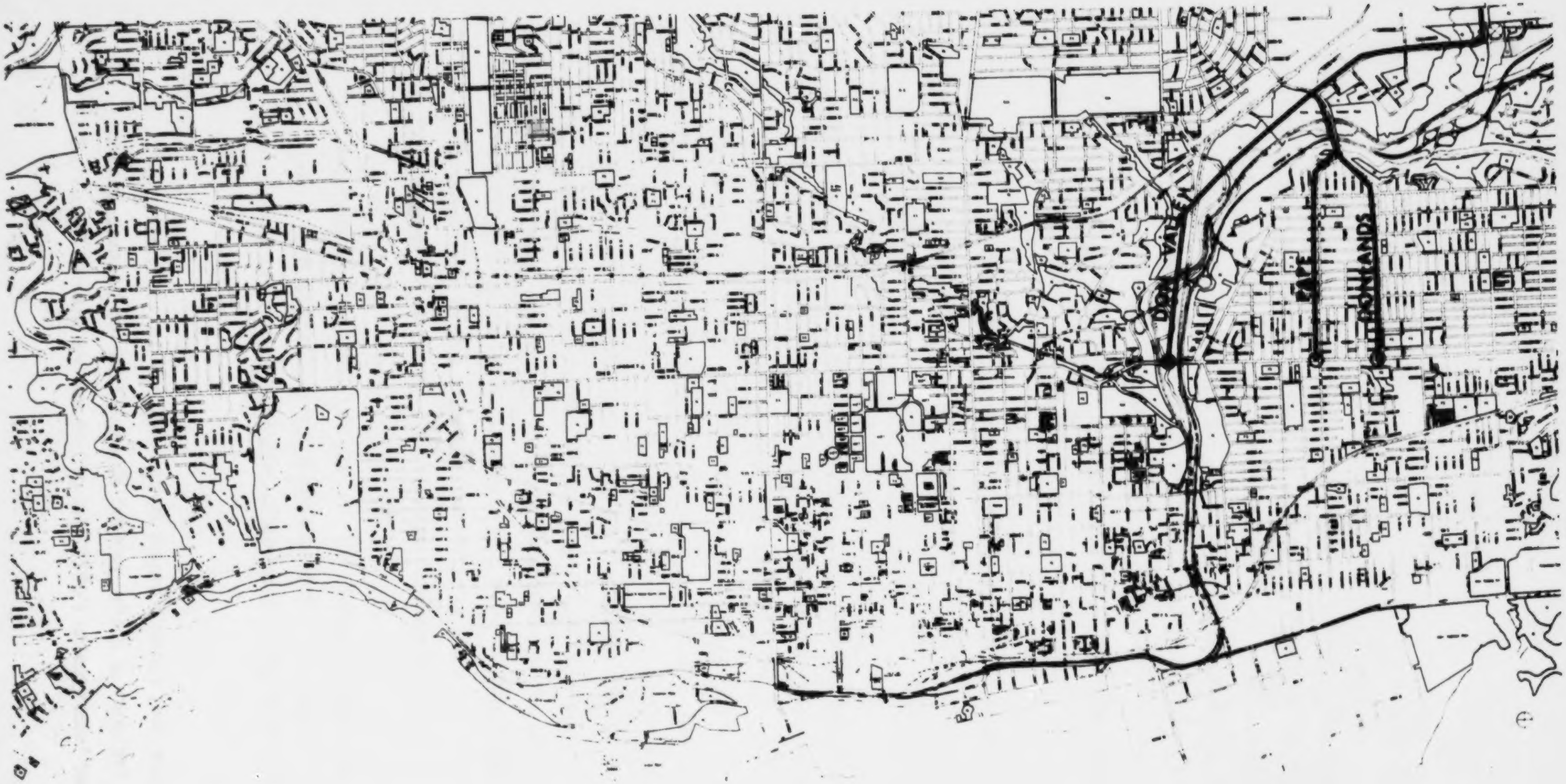
This is a variation on the Roncesvalles alternative which routes the line north on Parkside instead of north on Roncesvalles. It is considered that the park property on the west side of Parkside may provide an opportunity for a widened right-of-way, and an elevated guideway along the west edge of Parkside Drive is proposed. Elevated stations would be located at the Queensway and Howard Park, and an underground station at Bloor Street.

The North-Eastern Section

Exhibit 2.5 illustrates the options considered in the Study for possible extension of Rapid Transit service north of Danforth Avenue. The choice of an alignment north of Danforth is of course, dependent upon the decision made regarding the alignment for the relief line between the Danforth Subway and downtown.

The Don Valley option primarily would involve an elevated alignment north of the Bloor Viaduct to Overlea Boulevard. An elevated system is required due to the Valley being prone to flooding.

Both the Donlands and Pape alignments involve underground construction from the Danforth to the Don Valley, with an underground station proposed at Cosburn Avenue. In 1968 the Leaside Bridge was reinforced to provide six traffic lanes. This report assumes that the Rapid Transit service across the valley to Thorncliffe Park would involve either a new bridge parallel to the Leaside bridge, or utilization of the existing bridge through further reinforcing measures. At the level of effort included in the Study it was not practical to confirm a specific solution through a rigorous structural analysis. North of the Leaside Bridge the alignment is proposed to follow Overlea Boulevard and Don Mills Road on an elevated guideway located in the median of these streets.


DON VALLEY
PAPE
DONLANDS

EXTENSIONS NORTH OF DANFORTH

EXHIBIT 2.5

SECTION 3 - SYSTEM STAGING

The Downtown Rapid Transit line in its entirety includes a proposed U-shaped rapid transit line from the Danforth Subway serving the Financial District and Exhibition Place to the Bloor Subway, with provision for future extensions to Eglinton Avenue in the vicinity of Don Mills in the east, and Weston Road in the west. In the Metro/TTC Rapid Transit Study of 1982 the conclusion was reached that a relief line from Union Station to Danforth Subway was required as a priority, and that other phases of the Downtown Rapid Transit line could be deferred for possible later implementation.

This report concurs with phasing the east leg as a priority except that the recommendation for the western terminus of the first phase is Spadina Avenue rather than Union Station at Bay Street.

Firstly, a review of the rationale for developing the east leg as a priority phase of the Downtown Rapid Transit proposal. The addition of one new Rapid Transit line with a capacity of 20,000 passengers per hour into the downtown would increase rapid transit capacity into the Financial Core by about 23%, compared to today's capacity on the Yonge-University Subway and the GO Rail Lakeshore service. Combined with improvements in the GO Rail service, which are now under study, and surface transit improvements such as the Spadina LRT, this additional rapid transit capacity will meet demand into the downtown to well beyond the year 2001. Therefore, a phased program involving priorizing either the east leg or the west leg will satisfy long term demand forecasts, and would be the least inconsistent with the present wording of the Metropolitan Official Plan. In favouring the east leg over the west leg the following factors were considered:

1. Overcrowding is more severe on the Yonge Subway and at Yonge-Bloor Station than on the University Subway and at St. George Station. Therefore, an alternative route for traffic originating in the east will provide the most effective relief.

2. The eastern leg of the Downtown Rapid Transit line will offer relief from future demand on the Danforth Subway which is forecast to reach Level of Service F demand by the mid to late 1990's unless relief facilities are built.

In this study it has been concluded that the western terminus of the first phase should be Spadina Avenue, rather than Union Station as indicated in the Metro/TTC Rapid Transit Study report. The reasons behind this recommendation are:

1. A continuation of the line to Spadina Avenue will improve integration with the surface transit system by connecting with the proposed Spadina LRT or existing Spadina Avenue transit services. With continuing development of the Waterfront, a Spadina and Waterfront LRT is expected to become an important downtown distributor, which will be more effective if connected to the Downtown Rapid Transit line at both Spadina Avenue and Bay Street.

2. A continuation of the line to Spadina Avenue will improve accessibility to the proposed Spadina Subcentre of the Railway Lands Development, to the Convention Centre, and to the CBC development site.

The West Extension to Bloor-Dundas

The west extension of the Downtown Rapid Transit line may be needed to relieve potential overcrowding of the Bloor Subway west of Spadina Station, or to relieve traffic snarled downtown west streetcar lines.

The Eglinton West Rapid Transit Study Report 4.01 forecasts a Level of Service F on the Bloor Subway by the year 2001 if relief facilities are not built. This relief to overcrowding on the Bloor Subway can be achieved by building either the Eglinton West Rapid Transit line or the west leg of the Downtown Rapid Transit line connecting to Dundas West Station.

The mixed traffic operation of streetcars on King Street and Queen Street West has led to an unsatisfactory level of service and a very inefficient transit operation. This situation could be improved through transit priority measures on Queen Street and King Street. However, these measures would restrict auto movement and parking and loading for local businesses, and thus, would be introduced at the expense of auto traffic. Extending the DRT line westerly from Spadina Avenue to a transit terminal at Roncesvalles and Queen would offer a faster trip into downtown Toronto for existing transit patrons on Roncesvalles and The Queensway.

The North Extension to Eglinton-Don Mills

A northerly extension of the east leg of the Downtown Rapid Transit line to Eglinton Avenue would become a transportation consideration if the Yonge Subway north of Bloor becomes overcrowded, or if surface transit inadequately serves future growth of a proposed Centre in East York at Thorncliffe Park, and the Don Mills-Eglinton office park area. The Downtown Rapid Transit extension to Eglinton would reduce the demand on the Yonge Subway by providing an alternative rapid transit route for downtown destined bus passengers on Lawrence and Eglinton Avenues, and would provide transportation support for the commercial and residential development of Thorncliffe Park, Flemingdon Park and the office park area of Eglinton-Don Mills.

SECTION 4 - EVALUATION

Evaluation matrices summarizing the evaluation process are shown in Exhibits 4.1A, B, C and D for Central Section, and Exhibits 4.2A, B, C and D for the Eastern Section. Notes relating to the scoring of individual criteria are presented in Appendix A. The alternative alignments were evaluated under the following criteria:

A TRANSIT SERVICE

Trip Diversion Potential
Service to Financial District
Service to Railway Lands
Service to East Toronto
Service to Exhibition Place
Service to Existing/Proposed Central Area Office Space
Integration with Transit

B LONG TERM POLICY COMPLIANCE

TTC Long Range Plan
Metropolitan Toronto Official Plan
City of Toronto Official Plan
Borough of East York Official Plan

C ECONOMICS

Capital Cost
Operating Costs
Savings by Removal of Parallel Surface Routes

D ENVIRONMENTAL IMPACT

Natural
Social
Cultural

E IMPLEMENTATION

Availability of Right-of-Way
Constructability
Flexibility

NOMENCLATURE FOR EVALUATION MATRICES

Individual criteria were rated on a three point scale of Good, Fair and Poor.

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

For notes under the commentary column the reader should refer to Appendix A.

CENTRAL SECTION

(Spadina to Don River)

QUEEN - Queen Street (underground) from Queen/Spadina to Queen/CN Kingston Rail Line.

KING - King Street (underground) from King/Spadina to King/CN Kingston Rail Line.

WELLINGTON - Wellington (underground) from Wellington/Spadina to Front/Bayview.

FRONT (UG) - Front (underground) from Front/Spadina to Bay, and at-grade along Railway from Bay to Don River.

FRONT (EL) - Front (elevated) from Front/Spadina to Bay, and at-grade along Railway from Bay to Don River.

RAILWAY - Esplanade West (elevated) from Esplanade/Spadina to Bay and at-grade along Railway from Bay to Don River.

BAY LRT - Bay LRT (underground) from Bloor to Union Station.

EASTERN SECTION

(Don River to Danforth)

DON VALLEY (BROADVIEW) - Don Valley (underground) from Bloor Viaduct to Lakeshore.

PAPE - Pape Avenue (underground) from Pape Station to Eastern Avenue, Eastern Avenue from Pape to Don River.

DONLANDS - Donlands Station to Greenwood Yards and continue along railway to Don River.

● - Positive Characteristics/Good
▲ - Neutral/Fair
○ - Negative Characteristics/Poor

EXHIBIT 4.1A

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

CENTRAL SECTION
(Spadina to Don River)

Screening Criteria	Queen	King	Wellington	Front (Ug)	Front (El)	Railway	Bay LRT	Comments
	OPTIONS							
A. TRANSIT SERVICE								
Trip Diversion Potential (Relief from Existing Overcrowding)								
- Yonge Subway/Yonge-Bloor Station	●	●	●	●	●	○	●	
- University Subway/St. George	▲	▲	▲	▲	▲	○	●	See Note A1
- Danforth Subway	●	●	●	●	●	○	○	
Service to Financial District	▲	●	●	▲	▲	○	●	
Service to Railway Lands	○	▲	▲	●	●	●	○	See Note A2
Potential Service to Exhibition Place	○	●	●	●	●	●	○	See Note A3
Integration with Transit								See Note A4
- Existing	●	●	●	▲	▲	▲	●	
- Proposed	▲	▲	▲	●	●	●	▲	See Note A5
Service to Central Area Office Space								
- Existing & Under Construction	▲	●	●	▲	▲	○	●	
- Active & Other Identified Proposals	○	●	●	●	●	●	●	See Note A6

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

EXHIBIT 4.1B

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

CENTRAL SECTION
(Spadina to Don River)

	OPTIONS							
Screening Criteria	Queen	King	Wellington	Front (Ug)	Front (El)	Railway	Bay LRT	Comments
B. LONG TERM POLICY COMPLIANCE								
TTC Long Range Plan	●	●	●	●	●	●	○	See Note B1
Metro Official Plan	▲	▲	▲	▲	▲	▲	▲	See Note B2
City of Toronto Official Plan	○	▲	▲	▲	▲	▲	▲	See Note B3
Borough of East York Official Plan	○	●	●	●	●	●	○	See Note B4
C. ECONOMICS								
Capital Costs	▲	▲	▲	▲	▲	▲	●	See Note C1
Operating Costs	▲	▲	▲	▲	▲	▲	●	See Note C2
Savings by Removal of Parallel Surface Routes	●	●	▲	▲	▲	○	●	See Note C3

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

EXHIBIT 4.1C

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

CENTRAL SECTION
(Spadina to Don River)

Screening Criteria	OPTIONS							
	Queen	King	Wellington	Front (Ug)	Front (El)	Railway	Bay LRT	Comments
D. ENVIRONMENTAL IMPACT								
Natural								
- Parks/Recreation Facilities	●	●	●	●	●	●	●	
- Streams	▲	▲	▲	▲	▲	▲	●	See Note D1
- Vegetation	●	●	●	●	●	●	●	See Note D2
- Noise	●	●	●	●	○	○	●	See Note D3
- Visual	●	●	●	●	○	▲	●	See Note D4
Social								See Note D5
- Community	●	●	●	●	○	●	●	
- Housing	▲	●	●	●	●	●	●	See Note D6
- Development Pressures	○	▲	▲	●	●	●	▲	See Note D7
Cultural								See Note D8
- Heritage Properties	▲	▲	●	●	○	●	●	
								See Note D9

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

EXHIBIT 4.1D

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

CENTRAL SECTION
(Spadina to Don River)

Screening Criteria	Queen	King	Wellington	Front (Ug)	Front (El)	Railway	Bay LRT	Comments
	OPTIONS							
E. IMPLEMENTATION								
Availability of Right-of-Way								
- Residential Properties	▲	●	●	●	●	●	●	See Note E1
- Commercial/Institutional Properties	○	▲	▲	●	●	●	●	See Note E2
- Railway Properties	●	●	●	▲	▲	○	●	See Note E3
- Impact on Public Roadways	●	●	●	●	○	▲	●	See Note E4
Constructability								
- Public Nuisance During Construction	○	○	▲	○	○	●	▲	See Note E5
- Traffic Impact During Construction	○	○	▲	○	○	●	○	See Note E6
- Utility Impact During Construction	▲	▲	▲	○	▲	▲	▲	See Note E7
- *Ease of Construction*	○	○	○	○	▲	●	○	See Note E8
- Dependency on Undertakings by Others	●	●	●	▲	▲	○	●	See Note E9
- Exposure to Sensitive Impact Areas	▲	▲	▲	▲	▲	▲	●	See Note 10
Flexibility								
- Staging Opportunities	●	●	●	●	●	●	○	See Note E11
- Alignment Geometry	●	●	●	○	○	○	●	See Note E12
- Yard Locations	○	●	●	●	●	●	○	See Note E13
- Opportunities for Extension	▲	●	●	●	●	●	○	See Note E14

EVALUATION DISCUSSION

The following summary focuses on the differences between the various alternatives, and seeks to identify a preferred DRT alignment. The routes through the Central and Eastern Sections can, for the most part, be selected independent of one another. With one exception, all Eastern Section alternatives potentially connect with all Central Section alternatives. The exception is that the Pape-Eastern alternative cannot be practically connected with the Central Section Queen alternative. The Bay LRT alignment is a separate proposal and is considered in the Central Section discussion. The Western Section options have not been thoroughly evaluated because of the conclusion that the western terminus of the first phase should be at Spadina Avenue.

CENTRAL SECTION

A. Transit Service

QUEEN AND RAILWAY

The Queen and Railway alignment alternatives would not provide sufficient transit service in terms of serving the combination of existing and forecast trips destined to the Financial District and emerging development areas adjacent to the Central Core. The reasons for this are discussed below.

Although the Queen alignment would achieve a reasonable level of diversion in terms of attracting existing (1984) subway riders from the Danforth, Yonge and University Subway lines, it is too far north to effectively serve the majority of future trips to new development in the existing Financial District and does not at all serve the proposed Railway Lands Development. Only 0.3 m.s.m. of new development is either actively proposed or has been identified within 300 metres of the Queen alignment, compared to 1.8 m.s.m. for the Front Street and Railway alignments, and 1.3 m.s.m. for the Wellington and King Street alignments.

The Railway alignment is basically too far south to effectively serve existing Central Core office employment, which is primarily concentrated in the Financial District north of Front Street. A Railway alignment basically would serve only proposed development within and along the fringes of the Railway Lands, and little else. Although service to the Railway Lands is desirable, a DRT line along King, Wellington or Front would provide superior service to the combination of both the Railway Lands and existing employment centres and, as a result, would provide more effective relief to the Yonge-University line than would the Railway Lands alignment.

BAY LRT

On a practical basis, the Bay alignment is limited to a form of Light Rail Transit technology using vehicles that can enter and leave service by way of the existing surface streetcar network.

The possibility of using subway cars by connecting the Bay line to the existing subway for access to yard facilities was considered in the Study. At the south end of the line, the Yonge-University Subway is constructed with minimum radius operating curves and therefore, it is impossible to develop a track alignment that would connect either the Yonge or the University tracks to a line on Bay Street. At the north end, the problems of connecting to the Bloor-Danforth Subway are equally difficult. From Spadina Station to Yonge-Bloor Station the existing subway track consists of ramps, cross-overs, and switches required for the wye connection between the Bloor-Danforth and the University Subways. The only possible connection between a subway on Bay and the Bloor Danforth would be between Yonge-Bloor Station and Sherbourne Station.

A second alternative for employing subway technology on Bay involved developing a yard dedicated specifically to the Bay Subway. This would require a site of four to six hectares within the Central Area along the Bay Street corridor for car storage and maintenance. The Study concluded that there was no prcatical yard site available in this corridor for this purpose.

The adoption of a Light Rail Transit technology on Bay Street assumed the use of articulated streetcars operating on a line that would be integrated with the proposed Harbourfront LRT. The length and frequency of trains on the line will be restricted to what is acceptable for the surface operation along Queen's Quay. In this report it has been assumed that two car trains (50 metres in length) operating at a frequency of two minutes in each direction was the maximum practical density of transit vehicless for a surface system crossing streets at-grade. This limits the capacity of the LRT line on Bay Street to 8,100 passengers per hour compared to an existing surface transit capacity on Bay Street of 2,160 passenger per hour. This would result in a capacity increase of only 5,940 pph.

While a Bay LRT line may meet the most immediate and most apparent transit capacity problems into the downtown, the relief would be short lived. Investment in a Bay LRT would provide some relief from overcrowding on the Yonge Subway and at Yonge-Bloor Station but would be soon followed by renewed concerns over capacity problems on the Bloor-Danforth Subway and renewed demands for relief to overcrowding of the east-west Bloor-Danforth Subway.

The Bay LRT proposal would therefore fail to make a significant contribution to the long term needs for subway relief into the Central Area, compared to an east leg of the DRT which can offer capacity relief into the Central Area for both the Yonge-University line south of Bloor, and the Bloor-Danforth line east of Yonge. On a long term basis the DRT east leg would still leave the Bloor line west of St. George in need of relief facilities, which could be provided by either an Eglinton West Rapid Transit line, a west leg of the DRT line, or the proposed Spadina LRT.

KING, WELLINGTON AND FRONT ALIGNMENTS

The King, Wellington and Front Street alignments all score fair to good under all Transit Service criteria. Overall, King and Wellington score slightly better than Front, primarily because of the trip diversion potential to existing development.

The King, Wellington and Front Street alternatives all connect effectively with the underground pedestrian concourse system of the Central Core. (See Exhibit A-2 in Appendix A).

In terms of integration with transit, King and Wellington score better than Front for integration with existing transit (two connections with the subway); but Front scores better in terms of proposed new transit and comuter rail. The Front option would make a direct connection with the proposed Harbourfront LRT, as well as a direct connection to GO Rail at Union Station.

B. Long Term Policy Compliance

All proposals for additional Rapid Transit facilities into the downtown are expected to require revision to the Metro Official Plan. The only policy considerations distinguishing the alternative alignments are policies of the City of Toronto and Borough of East York with respect to the Queen Street alignment, and the Toronto Transit Commission and Borough of East York with respect to the Bay Street alignment.

The Queen Street alignment conflicts with City of Toronto policies to preserve low rise residential neighbourhoods adjacent to the Central Core. If a Queen line were constructed, neighbourhoods such as the area north of Queen between Spadina Avenue and Beverley Street, may come under pressure for redevelopment to higher densities. Also, because the Queen Street alignment can connect to the Danforth only at Donlands Station, it therefore would also conflict with Borough of East York's stated preference that the Relief Line should connect with Pape Subway Station.

The Bay LRT option was rated poor with respect to compliance with TTC Long Range Plan and Borough of East York Official Plan. Non-compliance with the TTC Plan is significant because a Bay LRT, while achieving some relief to the Yonge Line, does not conform with any long term system strategy for implementation of future rapid transit facilities serving all of Metro. Non-compliance with East York has been inferred because a Bay LRT does not offer improved service to that municipality, whereas the King, Wellington, Front and Railway options can potentially connect with Pape Station (East York's preference) and can be extended north to Don Mills/Eglinton.

C. Economics

An economic comparison of the alternatives is contained in Appendix D. Capital costs (including construction, vehicles and property) and operating costs are presented for the various options from Spadina Avenue to the Danforth Subway.

D. Environmental Impact

The major environmental issue associated with proposed Rapid Transit alternatives into the downtown are development pressures inconsistent with existing planning policies, and the physical impact of a possible elevated system on the quality of downtown Toronto's urban form.

There are two areas of concern regarding development pressures. One concern has to do with the attraction of additional employment to the Central Area from other areas of the Metro Region. The second concern relates to the locational distribution of employment within the Central Area and the desire to retain existing neighbourhood characteristics in designated low rise residential areas.

The first concern, that of attracting and centralizing employment in the Central Area, is discussed in more detail in the Metro/TTC Downtown Rapid Transit Report 2.01 which concludes that the decline in the relative importance of the downtown in the Metro Region office market will continue. In Report 2.01 the downtown is forecast to capture between 20% and 40% of future office development in the Metro Region, compared to 46% over the past fifteen years. The evaluation of alternative alignments for a DRT facility is developed on the basis that the need for a DRT facility is being generated by an increasing dependency on transit for work trips into the downtown, with overall Central Area employment levels remaining reasonably consistent with current planning policies. This growing dependency on transit is documented in Report 2.01, where surveys show that over 90% of growth in work trips into the Central Area over the past twelve years has been transit dependent.

Development pressures will be associated with station locations. In terms of transit service and transit integration, the stations regarded as essential to the transit service include Danforth, Queen, Yonge, University and Spadina if the alignment is along Queen, King or Wellington; and Danforth, Queen, Union, Convention Centre and Spadina if the alignment is along Front Street. For purposes of local accessibility, additional stations are proposed at Gerrard and Sherbourne. Decisions on whether to build these additional stations should be based on local planning and transit issues. Concerns regarding development pressures should be debated at the local planning level and this debate should be a determining factor towards settling the issue of development densities in the vicinity of possible stations at Sherbourne or Gerrard.

The Front-elevated option has the potential for severe environmental impact in the area of noise, vibration and visual intrusion, and to be successful places rigid demands on the technology and the architecture proposed.

In early 1985 the Scarborough R. T. will open as the first elevated transit line in Metro. Its concept pivoted around two important decisions. A decision to adopt a technology that is considered to reduce much of previous concern about noise and vibration, and a decision to design the system through active participation of architects hired by the Toronto Transit Commission, and staff planners of the City of Scarborough.

In order to gauge the visual impacts of an elevated line on Front Street, the DRT Study commissioned perspective drawings of the proposed elevated stations at Union Station and the Convention Centre. These are presented in Appendix C. The plans do not represent solutions, but rather the nature of possible solutions to the architectural demands of these locations.

E. Implementation

Three operations typically emerge as the prime factors in the implementation of a major construction program in a built-up urban area:

- Availability of right-of-way
- Maintenance of vehicular and pedestrian traffic during construction, and
- Maintenance of vehicular and pedestrian access to adjoining properties and businesses during construction.

Right-of-way availability is most difficult to achieve for the elevated Front Street option. Between Spadina and Bay the line would require the acquisition of property from the south edge of the CBC site between John Street and Simcoe Street for a station at the Convention Centre. Support columns for the elevated structure would likely impact on traffic operations between Spadina and York Street, thereby requiring turn restrictions into adjacent properties. The underground alignment on Front would involve limited property requirements for access stairs and escalators at stations. Between Bay Street and the Don River the right-of-way for both elevated and underground Front Street options is dependent upon satisfactory negotiations with the Toronto Terminals Railway and reconstruction of a high voltage HEPC power line.

By comparison, the underground alignment on Wellington and King Streets involves limited property requirements in station areas for access stairs and escalators, plus moderate property requirements involving a sub surface easement through Clarence Square for the Wellington alignment, and a sub surface easement in the block bounded by Berkeley, King, Parliament and Front for the King alignment. Additionally, both the King and Wellington options are proposed to cross above the existing University Subway line, resulting in displacement of underground parking spaces in the garage that runs from Front Street to King. The Wellington option has the most significant impact on this garage. The property cost component of the capital cost estimates for these two options reflect this impact.

The presence of streetcar service, theatres and shopping areas make King Street and Queen Street the most difficult alignments on which to maintain traffic and access during construction. While there is limited streetcar service on Wellington, the one-way traffic on that street will offer an advantage in staging construction operations. The presence of the Convention Centre, Hotels and Union Station will tend to increase the level of public nuisance caused by any construction on Front Street.

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

EXHIBIT 4.2A

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

EASTERN SECTION
(Don River to Danforth)

SCREENING CRITERIA	OPTION DON VALLEY (Broadview)	PAPE EASTERN	DONLANDS RAILWAY	COMMENTS
A. TRANSIT SERVICE				
Trip Diversion Potential (Relief from Existing Overcrowding)				
- Yonge/University	●	●	▲	
- Danforth Subway	●	●	▲	See Note A1.
Service to East Toronto	○	●	●	See Note A2.
Service to Major Traffic Generators	○	●	▲	See Note A3.
Integration with Transit				
- Existing	▲	●	▲	See Note A4.
- Proposed	○	▲	▲	See Note A5.

- ● - Positive Characteristics/Good
- ▲ - Neutral/Fair
- ○ - Negative Characteristics/Poor

EXHIBIT 4.2B

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

EASTERN SECTION
(Don River to Danforth)

	OPTION			
SCREENING CRITERIA	DON VALLEY (Broadview)	PAPE EASTERN	DONLANDS RAILWAY	COMMENTS
B. LONG TERM POLICY COMPLIANCE				
TTC Long Range Plan	▲	●	●	See Note B1.
Metro Official Plan	▲	▲	▲	See Note B2.
City of Toronto Official Plan	▲	▲	▲	See Note B 3.
City of East York Official Plan	○	●	○	See Note B4.
C. ECONOMICS				
Capital Costs	○	▲	▲	See Note C1.
Operating Costs	▲	▲	▲	See Note C2.
Saving by Removal of Parallel Surface Routes	▲	▲	▲	See Note C3.

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

EXHIBIT 4.2C

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

EASTERN SECTION
(Don River to Danforth)

SCREENING CRITERIA	OPTION			COMMENTS
	DON VALLEY (Broadview)	PAPE EASTERN	DONLANDS RAILWAY	
D. ENVIRONMENTAL IMPACT				
Natural				
- Parks/Recreation Facilities	○	●	▲	See Note D1.
- Streams	○	●	●	See Note D2.
- Vegetation	○	○	▲	See Note D3.
- Noise	●	●	▲	See Note D4.
- Visual	●	●	▲	See Note D5.
Social				
- Community	●	▲	●	See Note D6.
- Housing	○	●	●	See Note D7.
- Development Pressures	▲	●	○	See Note D8.
Cultural				
- Heritage Properties	●	●	●	See Note D9.

● - Positive Characteristics/Good

▲ - Neutral/Fair

○ - Negative Characteristics/Poor

EXHIBIT 4.2D

DOWNTOWN RAPID TRANSIT - EVALUATION MATRIX

EASTERN SECTION
(Don River to Danforth)

	OPTION			
SCREENING CRITERIA	DON VALLEY (Broadview)	PAPE EASTERN	DONLANDS RAILWAY	COMMENTS
E. IMPLEMENTATION				
Availability of Right-of-Way				
- Residential Properties	●	▲	○	See Note E1.
- Commercial/Institutional Properties	▲	▲	▲	See Note E2.
- Railway Properties	●	●	○	See Note E3.
- Impact on Public Roadways	●	●	●	See Note E4.
Constructability				
- Public Nuisance During Construction	●	○	▲	See Note E5.
- Traffic Impact During Construction	○	▲	●	See Note E6.
- Utility Impact During Construction	●	▲	●	See Note E7.
- Ease of Construction	○	▲	▲	See Note E8.
- Dependency on Undertakings by Others	●	●	▲	See Note E9.
- Exposure to Sensitive Impact Areas	○	▲	▲	See Note E10.
Flexibility				
- Staging Opportunities	●	●	●	See Note E11.
- Alignment Geometry	▲	▲	○	See Note E12.
- Yard Locations	○	▲	▲	See Note E13.
- Opportunities for Extension	●	●	●	See Note E14.

EASTERN SECTION

All of the Eastern Section alternatives connect with any one of King, Wellington, Front or Railway Central Section routes. Only the Donlands alternative for the Eastern Section can make a practical connection to the Queen Street alternative.

A. Transit Service

Overall, the Pape-Eastern and Donlands-Railway alternatives rate fair to good for all criteria, with Pape scoring consistently better than Donlands. Don Valley scores the worst, rating poor under Service to East Toronto, Service to Major Traffic Generators and Integration with Transit.

In terms of trip diversion potential, the Don Valley alternative theoretically would attract the highest ridership (8-9% higher than Pape). This advantage however, may be offset by the inconvenient transfer from Broadview Station to the proposed DRT Station (15 metre vertical separation) and by a possible reluctance by passengers who transferred at Pape Station from a bus to the Danforth line, to transfer again two stops later at Broadview.

Pape Station theoretically achieves 10-12% higher diversion than Donlands. This could potentially be changed by rerouting some high volume bus routes from Pape Avenue to Donlands Avenue. The bus handling capacity at Donlands, however, is quite limited and the residential nature of Donlands Avenue would argue against this bus rerouting.

The major strength of Pape-Eastern in terms of service, is the established high volume bus corridor with reserved lanes feeding Pape Station. The recently completed Don Valley Transportation Corridor Study identified a potential for routing some proposed express bus service to feed the DRT line. Of the three alternative Eastern Section routes, Pape-Eastern offers the best opportunity for accommodating such proposed bus service. The bus handling facility at Pape will require some expansion if the full potential is to be realized.

B. Long Term Policy Considerations

The three alternatives score identically with respect to Metro and City of Toronto Official Plans.

The major policy issue affecting the Eastern Section alternatives is the stated preference by the Borough of East York as expressed in their draft Official Plan, for the DRT line to connect with the Danforth line at Pape Station. In brief, East York's concerns relate to the destabilizing influence that a connection at Donlands Station would have on the surrounding predominately low density residential area. East York has expressed the view that Pape would be more appropriate because the land use fronting Pape (north of Danforth) is primarily commercial and institutional, and because Pape Avenue is an already established transit route.

East York has further stated a preference for the DRT line to be built to the Don Mills Road/Eglinton Avenue East as part of the first phase of construction, or at least to their designated Centre at Thorncliffe. Extension of the line as such would certainly add support to East York's aspirations to develop a major centre at Thorncliffe. It would also bring the DRT project more in conformance with the Metro Official Plan, which advocates supporting development centres through the provision of transit.

The primary objective of the DRT line, however, is to relieve overcrowding of the Yonge Subway line south of Bloor. An extension of the DRT line north of Danforth may be warranted at such time as relief to the Yonge line north of Bloor is required.

C Economics

An economic comparison of the alternatives is contained in Appendix D. Capital costs (including construction, vehicles and property) and operating costs are presented for the various options from Spadina Avenue to the Danforth Subway.

D. Environmental Impact

Overall, the Don Valley alternative rates the poorest, especially in terms of its impact on the Natural Environment. Construction of a rapid transit line through the Don Valley would result in both temporary and permanent disruptions to the ravine and parklands.

Donlands ranked second best overall. The most significant impact associated with this alignment is development pressures in the vicinity of Donlands/Danforth. The Planning Department for East York, in a letter to the DRT Project stated:

> "Donlands Avenue runs through a good quality, single family home area and the long range plans are for this neighbourhood to remain stable. ...The new senior citizens apartment building under construction on the former Donlands Dairy site is a unique situation and does not represent a trend to higher densities. ...The placing of the DRT on Donlands may lead to speculative pressures for changes to higher densities, and this contradicts the policy of Council."

The Pape-Eastern alignment scores best, and given that Pape-Eastern is proposed to be underground, the line would be reasonably compatible with adjacent land uses.

E. Implementation

Right-of-way acquisitions for any one of the three alternatives is not considered a major factor except for properties affected by the Donlands-Railway option. This alignment would require the acquisition of a three to four metre strip on the south side of the CN railway right-of-way between Eastern Avenue and Leslie Street which would affect residential, commercial and recreational properties.

The maintenance of vehicular and pedestrian traffic, and property access is least difficult for the Donlands alternative, and of significant to moderate difficulty for the Don Valley and Pape options. The Don Valley alignment is beneath Bayview Avenue between Front Street and Gerrard requiring surface decking with traffic restrictions similar to previous subway projects in Metro. This alignment also crosses beneath the Don Valley Parkway requiring careful staging and the construction of diversion lanes in order to maintain traffic capacity.

The Pape-Eastern alternative involves cut and cover construction on both Eastern Avenue and Pape Avenue, requiring surface decking and traffic restrictions to maintain traffic and access during construction.

Although all alternatives involve construction difficulties, the Don Valley alternative may require temporary diversions of the Don River, special construction techniques to minimize damage to the natural environment, and possible underpinning of bridge structures. Since the Valley lands are sensitive to erosion and flooding, special care would have to be taken to minimize soil loss from embankments when vegetation is removed during construction, and the construction site would have to be protected against flooding.

In terms of flexibility, the Don Valley route is an undesirable choice. The yard site associated with it is the least assured with respect to availability because it was recently purchased by a developer who has applied to East York for approval of a major commercial/residential development. Even if the yard were readily available, the length of spur line required north of Bloor in order to access the yard site, would suggest that in practice the line should be continued to at least Overlea Boulevard in the first stage, thereby eliminating a two staged approach.

SECTION 5 - DESCRIPTION OF TECHNOLOGY OPTIONS

The question of technology is not an essential factor in the conclusion of this Study. The Study assumed an ICTS technology to provide a framework for geometric planning and environmental impact evaluation. However with a limited number of changes in geometry a subway technology could be readily adopted.

The only essential question in selecting technology will be the question of line capacity. Ridership studies by the Planning Department of Metro Toronto have forecast ridership on a new line into the downtown of approximately 16,000 passengers per hour on an average annual basis, and 18,000 passengers per hour on a peak season basis by the year 2001.

These passenger loads dictate a fully grade separated rail transit system using conventional subway or the Scarborough Rapid Transit type vehicles. The choice of technology is more an operational than a planning matter.

A description of LRT, ICTS and Subway technologies is presented below:

Light Rail Transit (LRT)

RIGHT-OF-WAY AND STATIONS
Exclusive right-of-way with grade separated crossings at arterial streets and at-grade crossings at local streets. Low level platforms at stations spaced from one-half to two kilometres apart.

VEHICLES AND WAYSIDE
Twenty-four metre long, articulated streetcars operating singly or in trains of up to four vehicles. Line of sight operation, except that standard block signalling is to be used where the running speed exceeds 70 kph or operation is in tunnels. Track is at TTC gauge with overhead power collection.

OPERATIONAL CHARACTERISTICS

Operate at a minimum headway of 120 seconds with a line capacity of 16,200 pph at Level of Service E.

Intermediate Capacity Transit System (ICTS)

RIGHT-OF-WAY AND STATIONS

Exclusive right-of-way and fully grade separated with vehicular and pedestrian crossings. High level platforms at stations spaced from one to two kilometres apart.

VEHICLES AND WAYSIDE

Advanced light rail vehicles similar to the thirteen metre long vehicles operating on the Scarborough Rapid Transit (SRT), or the twenty-two metre long and slightly wider vehicles proposed for the GO ALRT line, operating in trains of two to six vehicles. Advanced vehicles and wayside technology including fully computerized train control, low wayside power rail, linear induction motors (LIM) and steerable truck components. Maximum running speed is 88 kph, track is at standard railway gauge.

OPERATIONAL CHARACTERISTICS

Operate at a minimum headway of 90 seconds with a line capacity of 18,000 pph at Level of Service E using six Scarborough type cars per train, or a minimum headway of 120 seconds with a line capacity of 30,600 pph at Level of Service E using six of the longer GO ALRT type cars per train.

Subway

RIGHT-OF-WAY AND STATIONS

Exclusive right-of-way and fully grade separated with vehicular and pedestrian crossings. High level platforms at stations spaced from one to two kilometres apart.

VEHICLES AND WAYSIDE

Twenty-three metre long subway cars similar to those used on the existing subway operating in trains of four to six vehicles. Block signalling with manual control and low wayside power rail similar to the existing subway. Maximum running speed is 88 kph. Track is at TTC gauge.

OPERATIONAL CHARACTERISTICS

Operate on a minimum headway of 128 seconds with a line capacity of 34,000 pph at Level of Service E.

SECTION 6 - CONCLUSIONS AND RECOMMENDATIONS

Central Section

On the basis of the foregoing evaluation, the Front-Railway option represents the preferred alignment for the Central Section of the DRT line. This route, with a connection at Union Station, would provide good transit service to existing employment locations in the Financial District north of Front Street, and would provide maximum service to proposed Central Area employment locations both north and south of Front Street.

Of the other Central Section DRT alternative routes, the Queen Street and Railway options would provide the least adequate service and relief to the Yonge Subway. The Queen Street route is too far north to effectively serve future office locations. The Railway option is too far south to effectively serve existing employment locations and, as a result, would not achieve the same degree of relief to the Yonge-University line as would the other DRT options such as Front or Wellington, and is highly dependent on the timely removal of tracks in the Railway Lands.

The Bay LRT option, while achieving some relief to the Yonge-University Subway, would not provide any relief to the Bloor-Danforth line. Although its estimated capital and operating costs are less than the DRT options (see Appendix D), the maximum capacity of the Bay LRT line is only 8100 passengers per hour, which is significantly less than the maximum capacity of the proposed DRT line. Extending the Bay line further north to provide eventual relief to the Yonge Subway north of Bloor is not practical with the limited capacity LRT proposal because all available capacity will have been utilized by the south of Bloor section. Subway technology is not feasible for the Bay line as proposed, because it is not physically possible to connect to either the Bloor-Danforth or Yonge-University Subway lines for access to storage and maintenance yard.

In selecting the Front-Railway route, it has been assumed that development of the Railway Lands will proceed in the foreseeable future and that it is desired that such development be encouraged through the provision of transit. This is not to say, however, that the Wellington or King options would not adequately serve the Railway Lands. Rather, the King or Wellington options simply would not serve these lands as well as the recommended Front-Railway alignment.

With respect to vertical alignment, both elevated and underground systems have been shown to be technically feasible for the section of the route along Front Street between Bay Street and Spadina Avenue. The basic trade-off between these two options is the $52M additional construction cost associated with the underground option versus the visual impact of an elevated line in terms of urban design, particularly in the vicinity of Union Station. While the elevated option was given serious consideration, it was concluded by the Study that introducing an elevated system on Front Street would be considered unacceptable with respect to its visual impacts and reduction of pavement and sidewalk widths. This conclusion was drawn based on discussions with City of Toronto Planning and Public Works Departments and developers in the area. Additionally, the underground option offers a better solution in terms of improved pedestrian linkages at Union Station. Perspective drawings of the elevated option, and a schematic drawing showing proposed pedestrian linkage improvements at Union Station, are presented in Appendix C.

Implementation of this alignment is subject to satisfactory negotiations for the use of Toronto Terminals Railway right-of-way between Bay Street and the Don River, and the reconstruction of a Hydro Electric Power Commission high voltage power line. Difficulties in acquiring this right-of-way could impede progress in the implementation of the proposed alignment and an alternate position is recommended. This alternative position involves an alignment through the Central Area along Wellington and Front Streets from Spadina Avenue to the Don River where the line then becomes common with the recommended route.

In terms of service, the Wellington alignment is comparable to the Front Street route. Its capital cost is $8-16M more than the Front-Railway option (depending on optional stations), reflecting that it is almost entirely underground through the Central Section.

The Wellington Street route is more consistent with planning policies than is the King option and impacts during construction would be less severe along Wellington, which is a four lane, one-way street with limited streetcar service compared to along King Street, which is a two-way street and a higher volume surface transit route.

Eastern Section

The Pape-Eastern alignment represents the preferred route for the Eastern Section of the DRT line. This route is entirely under public rights-of-way, whereas the Donlands-Railway route would be on or adjacent to a relatively narrow section of railway property, thereby requiring a unique elevated structure cantilevered over railway property. Additionally, because the railway corridor is so tight, some residential and commercial properties would be required adjacent to the rail corridor for column space and access during construction. Securing right-of-way through this section would involve extensive negotiations with Canadian National Railways. Such negotiations may prove to be significantly more difficult than with the Toronto Terminals Railway for the recommended Central Section route. The relatively narrow railway right-of-way associated with this Eastern Section alternative severely limits opportunities for accommodation of the potentially divergent requirements of CN and the TTC.

The Pape-Eastern route is preferred because it connects with Pape Subway station, which serves an established high volume bus corridor operating on reserved lanes. The bus handling facilities at Pape, although requiring some expansion, are better able to accommodate a higher volume of bus traffic than would Donlands Station.

Capital costs of the Pape-Eastern route, including provision for storage yards and maintenance facilities, vehicles and property, are $18 million less than either the Donlands-Railway option, which would require retention of the Kipling yard site in Etobicoke, or the Don Valley option, which is largely underground and for which the availability of a yard is less certain.

The Don Valley route is not considered practical because it does not offer a minimum cost at-grade option as had originally been thought, and because of the environmental impacts and implementation difficulties associated with it.

Lastly, the Pape-Eastern route conforms with the stated preference of the Borough of East York that the relief line connect with Pape Station so as not to destabilize the low density residential area in the vicinity of Donlands Station.

Overall Route

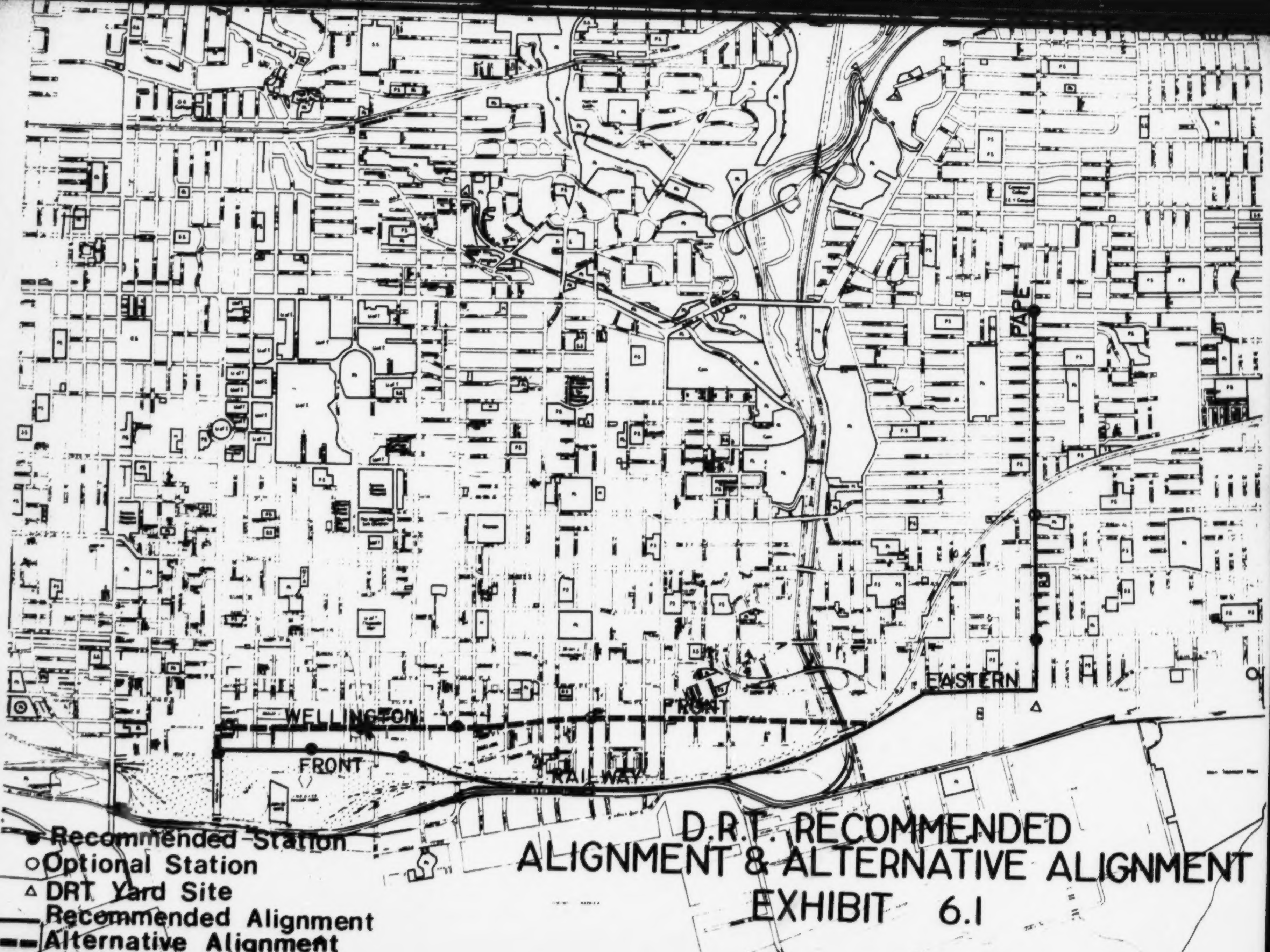
The recommended alignment and alternative alignment are shown in Exhibit 6.1. Detail plans of the recommended options are presented in Appendix F.

Both alignments involve yard requirements in the vicinity of Pape and Eastern Avenues, and the Study recommends that TTC take action to protect any lands necessary for this yard facility.

Capital costs (including construction, vehicles and property) for the recommended alignment and alternative alignment are $538 and $546 million, respectively, as shown in Exhibit 6.2. Net annual operating costs are $10.1 million, as shown in Exhibit 6.3. Capital and operating costs are presented in further detail in Appendix D.

Both the recommended alignment and the fallback alignment involve revisions to the Metro Official Plan, and the Study recommends that Metropolitan Toronto take action to incorporate the necessary revisions into the Official Plan.

Lastly, the terms of reference for the DRT Study require an assessment of the cost of making the system accessible to the transportation handicapped. TTC policy on this issue is to provide parallel service (Wheel-Trans) for the transportation handicapped. A review of TTC policy and a cost estimate for making the DRT system accessible is presented in Appendix G.


PAPE
EASTERN
FRONT
WELLINGTON
FRONT
RAILWAY
● Recommended Station
○ Optional Station
△ DRT Yard Site
—— Recommended Alignment
- - - Alternative Alignment

D.R.T. RECOMMENDED
ALIGNMENT & ALTERNATIVE ALIGNMENT
EXHIBIT 6.1

EXHIBIT 6.2

SUMMARY OF COST ESTIMATES FOR RECOMMENDED ALIGNMENT AND ALTERNATIVE ALIGNMENT

	Front-Pape Underground		Wellington-Pape	
Construction Costs	$ 407 M[1]		$ 416 M	
Vehicle Costs	$ 108 M		$ 108 M	
Property Costs	$ 23 M		$ 22 M	
Total Basic Costs	$ 538 M	($ 33.6M)	$ 546 M	($ 34.1M)
Options:				
Gerrard Station	$ 19 M		$ 19 M	
Sherbourne Station	$ 11 M		$ 19 M	
TOTAL WITH OPTIONS	$ 568 M	($ 35.4 M)	$ 584 M	($ 36.4M)

1. Includes Union Subway Station reconstruction

($ M) - Annualized cost assuming 12% interest rates, 6% inflation, 50 years amortization period for construction and property costs, and 30 years for vehicles.

EXHIBIT 6.3

DOWNTOWN RAPID TRANSIT OPERATING COSTS

Recommended Alignment and Alternative Alignment

Round Trip Distance (km)		15.5		
		Peak	Off Peak	
Average Speed (km/hr)		38	39	
Round Trip Time (Minutes:seconds)		24'30"	24'00"	
Line Capacity		20,000	4,100	
Vehicle Capacity		170	70	(Seated Load)
Headways	4-Car train	2'02"	4'06"	
Vehicles	Scheduled	48		
	Total (including spares)	54		

* * * * *

Operating cost savings arising from service adjustments on connecting surface routes[1]	$ 2.5 M

Annual Operating Costs	Gross DRT Costs	Net System Costs
4-Car (Stretched) ICTS Train	$ 12.6 M	$ 10.1 M

1. Service adjusted on following routes:

Flemingdon Park	(100)	Bus
Broadview	(8)	Bus
Carlton	(506)	Streetcar
Queen	(501)	Streetcar
Downtown	(502)	Streetcar
King	(504)	Streetcar
Sherbourne	(75)	Bus
Church	(19)	Bus

APPENDICES

Appendix A	Evaluation Matrix Notes
Appendix B	Summary of Environmental Impact
Appendix C	Perspective Drawings of Elevated Stations on Front Street
Appendix D	Summary of Capital and Operating Costs
Appendix E	Summary of Travel Demand Forecasts
Appendix F	Detailed Plans of Recommended Options
Appendix G	TTC Policy on Service For Transportation Handicapped

APPENDIX A

CENTRAL SECTION EVALUATION MATRIX NOTES

A. TRANSIT SERVICE

A1. Trip Diversion Potential

Based on diversion of existing (1984) subway ridership from Danforth Subway, destined to downtown (see Exhibit A-1). The Bay LRT will provide an alternative north-south service into the Financial District to passengers using the Yonge and University Subways, but does nothing towards relieving future east-west capacity problems on the Bloor and Danforth Subways.

A2. Service to Financial District

The King, Wellington and Bay alignments serve the 'centre of gravity' of the existing downtown Financial District, whereas the Queen, Front and Railway alignments follow the boundary of the Financial District. The underground pedestrian concourse system tends to extend the area of the Financial District served by a given alignment. The concourse system is presently more extensive in the south end of the Financial District than the north. The Front street alignments, therefore, would achieve higher utilization of the concourse system than would Queen (see Exhibit A-2). The Railway alignment does not penetrate the Financial District at all and would provide only limited service with improved pedestrian linkages to the existing concourse system.

A3. Service to Railway Lands

The Front and Railway alignments directly serve the proposed Railway Lands development. The King and Wellington alignment would provide limited service to the east end of the Railway Lands through improved pedestrian linkages and provide reasonable service to the west end (Spadina Subcentre) with proposed DRT stations in the Spadina/Wellington area. Through a pedway link across the proposed CBC site, the Wellington alignment can provide a superior connection than King to the Railway Lands in the Convention Centre/CN Tower area. Queen provides poor service to the Railway Lands. Similarly the Bay alignment does not serve the west end of the Railway Lands and provides no better service to the east end than does the existing Yonge-University subway.

A4. Potential Service to Exhibition Place

All DRT alignments except Queen, converge to one alignment in the vicinity of Front and Spadina. Any of these routes could potentially be extended along the proposed Front Street roadway extension to provide excellent service to Exhibition Place, (Ontario Place and Fort York). The Queen and Bay alignments do not offer any potential for serving Exhibition Place.

A5. **Integration With Transit** - (See Exhibit A-3)

Existing Transit

Queen, King and Wellington connect with the Yonge-University subway line at two stations, whereas Front connects to the subway only at Union. Railway alignment would provide only a pedestrian connection to the subway.

Queen and King provide service along corridors with parallel streecar service and 'connect with numerous north-south bus routes. Bay does not connect with north-south bus routes, but does connect with five east-west streetcar routes, and with the subway.

All alignments, except Queen, have pedestrian concourse access to GO Transit (Front, Bay and Railway alignments most direct).

Proposed Transit

Front and Railway alignments connect with both the proposed Harbourfront LRT and Spadina LRT. King, Wellington and Queen potentially connect with only the Spadina LRT and Bay with only the Harbourfront LRT.

A6. **Service to Central Area Office Space** - (See Exhibits A-4 and A-5)

Existing and Under Construction

King and Wellington DRT alignments have the highest amount of Central Area office space (2.7 and 2.4 m.s.m., respectively) within 300 m of their corridors. Queen and Front have about the equal amounts (1.4 and 1.6 m.s.m., respectively) and the Railway alignment has only a fraction of the above (0.4 m.s.m.). (Consistent with diversion analysis results).

Active and Other Proposals

King and Wellington alignments have about 1.3 m.s.m., Front and the Railway have about 1.8 m.s.m. Queen has very little development proposed within 300 m of its corridor (only 0.3 m.s.m). Amount of proposed development within 300 m of alternative corridors, can be considered to be proportional to diversion levels of future transit trips.

Overall

King and Wellington alignments have the highest overall amount of combined existing and proposed office development (4.0 and 3.7 m.s.m., respectively), closely followed by Front with 3.3 m.s.m. The Railway alignment, even with the Railway Lands development, does not exceed existing development along King or Wellington. Total for Queen is only 1.7 m.s.m., virtually ruling it out as a viable alignment in terms of best serving existing and future transit trips.

While the Bay LRT alignment would serve all of the existing and proposed Central Core development that is contained in the area bounded by the Yonge and University Subway lines, that area is already very well served by Subway. Further, the Bay LRT does not serve the emerging development areas to the west of the Financial District.

EXHIBIT A-1

COMPARISON OF DIVERSION FROM DANFORTH LINE TO ALTERNATIVE DRT ALIGNMENTS

Alternative Downtown Alignment	East Leg Terminal	Volume Diverted		Total Diversion
		From Yonge	From University	
QUEEN	Donlands	5	3	6
	Pape	6	4	7
	Broadview	6	4	7
KING*	Donlands	8	4	8
	Pape	9	4	9
	Broadview	10	4	10
WELLINGTON**	Donlands	7	3	7
	Pape	8	3	8
	Broadview	9	4	9
FRONT	Donlands	6	2	6
	Pape	7	2	6
	Broadview	7	3	7
RAILWAY LANDS	Donlands	3	1	3
	Pape	4	1	4
	Broadview	4	1	4

Based on diversion of estimated 1984 A.M. three hour rush period trips originating east of Donlands, Pape and Broadview Subway Stations on the Bloor line, and destined to the Central Area and within a 400 m walk of the proposed R.T. stations for the various downtown alignments.

* The King alignment with connection at Broadview Station is given score of 10.
** Interpolated

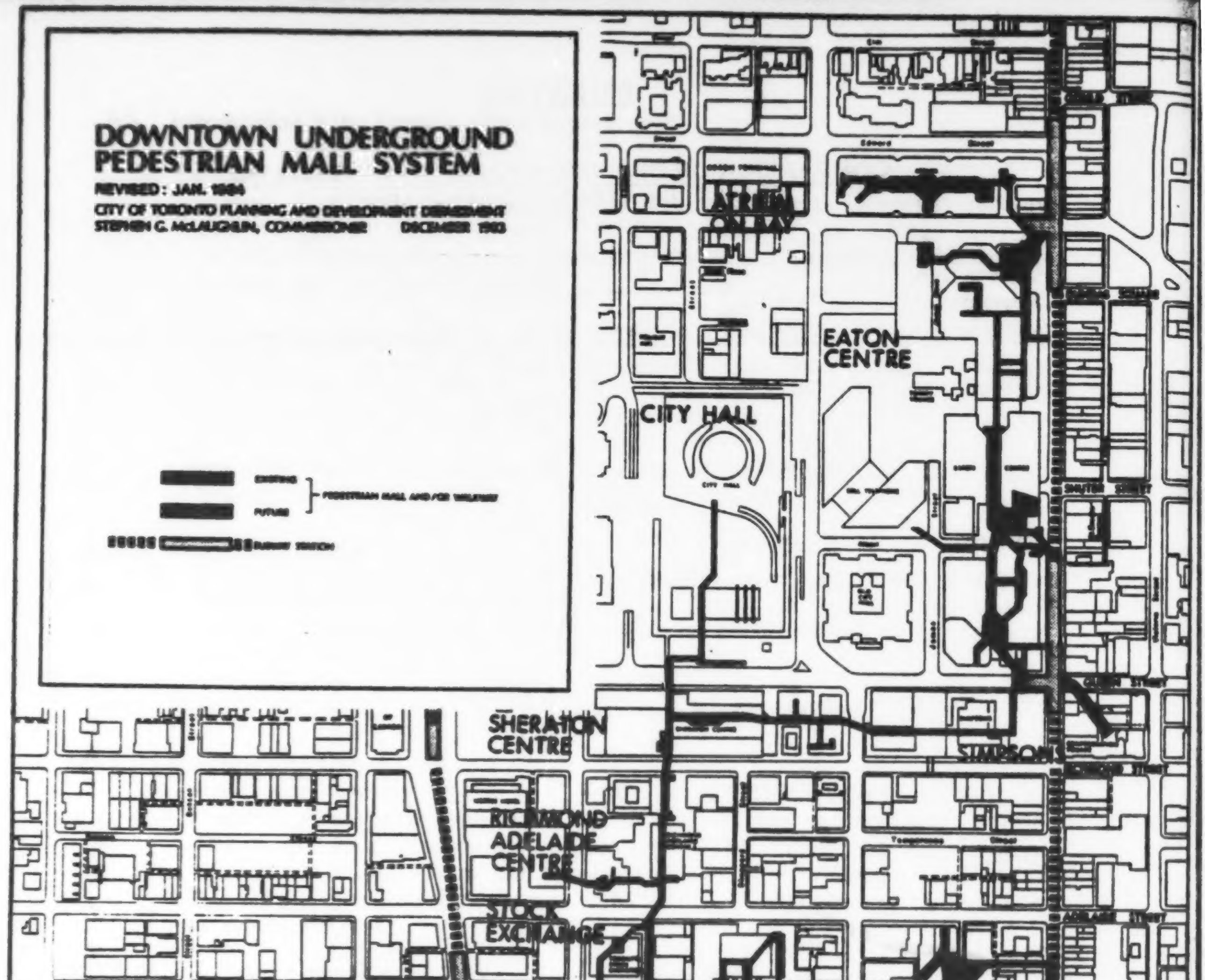
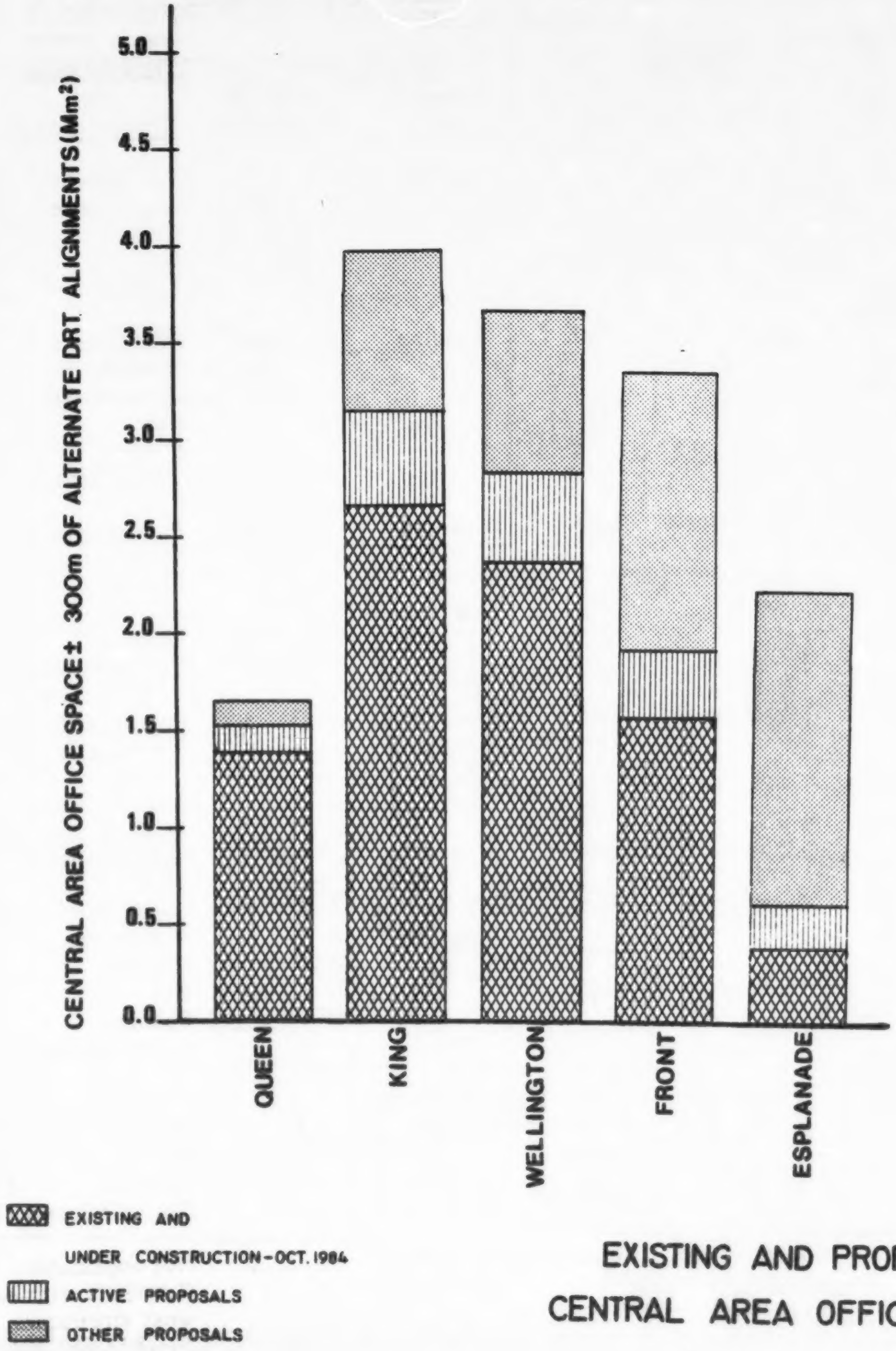

DOWNTOWN UNDERGROUND PEDESTRIAN MALL SYSTEM
REVISED : JAN. 1984
CITY OF TORONTO PLANNING AND DEVELOPMENT DEPARTMENT
STEPHEN G. McLAUGHLIN, COMMISSIONER
DECEMBER 1983
EXISTING
FUTURE
PEDESTRIAN MALL AND/OR WALKWAY
SUBWAY STATION
ATRIUM ON BAY
EATON CENTRE
CITY HALL
SHERATON CENTRE
SIMPSONS
RICHMOND ADELAIDE CENTRE
STOCK EXCHANGE
SUN LIFE CENTRE
FIRST CANADIAN PLACE
TORONTO DOMINION CENTRE
COMMERCE COURT
ROYAL BANK PLAZA
UNION STATION
SHUTER STREET
QUEEN STREET
RICHMOND STREET
ADELAIDE STREET
KING STREET
WELLINGTON STREET
FRONT STREET
CUSTOMS HOUSE
N

EXHIBIT A-2

EXHIBIT A-3
SUMMARY OF DRT CONNECTIONS WITH EXISTING/PROPOSED TRANSIT
Central Section

Option	Subway	GO	Proposed LRT	Parallel Streetcar	North/South Bus Trolley Coach	
QUEEN	Yonge & Univ.	—	Spadina	501	Parliament	65
				502	Sherbourne	75
					Church	19
					Bay	6
					Spadina	77
KING	Yonge & Univ.	Ped.	Spadina	503	Parliament	65
				504	Sherbourne	75
					Church	19
					Bay	6
					Spadina	77
					Commissioner	72
WELLINGTON	Yonge & Univ.	Ped.	Spadina	503	Parliament	65
					Sherbourne	75
					Church	19
					Bay	6
					Spadina	77
					Commissioner	72
FRONT	Yonge/Univ.	Ped.	Harbourfront		Parliament	65
			Spadina	—	Sherbourne	75
					Church	19
					Bay	6
					Spadina	77
					Commissioner	72
FRONT/RAIL	Yonge/Univ.	Ped.	Harbourfront		Parliament	65
			Spadina	—	Sherbourne	75
					Church	19
					Bay	6
					Spadina	77
					Commissioner	72
ESPLANADE	Ped.	Pos. direct connection	Harbourfront		Parliament	65
			Spadina	--	Sherbourne	75
					Bay	6
					Spadina	77
					Commissioner	72
BAY	Bloor/Danf.& Yonge/Univ.	Ped.	Harbourfront Spadina	BayT.C.	Not applicable Connects with east-west streetcars 501,502,504,505,506	

Ped. - Climate controlled pedestrian connection



EXISTING AND PROPOSED
CENTRAL AREA OFFICE SPACE

EXHIBIT A-4

TABLE A-5

COMPARISON OF EXISTING AND PROPOSED CENTRAL AREA OFFICE SPACE

Within 300 M of Alternative DRT Corridors

Alternative Alignment	Gross Floorspace[3] (M.S.M.)			
	Existing and Under Construction[1]	Active and Other Proposals[2]	TOTAL	
			300M	(500M)
Queen	1.384	0.266	1.650	(4.366)
King	2.671	1.301	3.972	(4.709)
Wellington	2.363	1.327	3.691	(5.126)
Front	1.573	1.768	3.341	(4.965)
Railway	0.370	1.835	2.205	(3.618)

Source:
City of Toronto Planning and Development Department

Notes:
1. As of October 1984
2. Other proposals include Railway Lands, Harbourfront, Central Bayfront, CBC, Eaton Centre Phase 2B and other potential Central Core redevelopment.
3. Net of demolitions for Active and Other Proposals.

B. LONG TERM POLICY COMPLIANCE

B1. TTC Long Range Plan

All DRT alignments are compatible with TTC Long Range Plan, which sets "relief to congestion on the Yonge Subway line as high priority".

Bay LRT does not conform with long term system strategy for implementation of future rapid transit facilities as set out in the TTC Long Range Plan.

B2. Metro Official Plan

Construction of any of the alignments will require amendments to Metro Official Plan, specifically to Section 6B-2a, which states: "...(Council) shall not support construction of additional rapid transit lines into Central Area".

Given success to date of Metropolitan Centres such as Scarborough City Centre, and North York Centre, and investment in roads and transit in support of these centres, the (multicentre) concept of the Official Plan may not be jeopardized by construction of DRT facility.

B3. City of Toronto Official Plan

Construction of any of the DRT alternative alignments requires an amendment to the City Official Plan, specifically to Section 7.5 which states:

> "Notwithstanding any other provisions of Section 7, it is the policy of Council that emphasis be placed on the movement of people by public transit. In the short term, however, Council shall support the increased use of public transportation during peak hours only to the extent that such use does not necessitate the construction of additional major transit facilities, the result of which would be to increase significantly the capacity of the transportation system serving the Central Core".

Reference to "the short term" in the above clause may more readily allow for amendments to the Plan during the 1986 Quinquennial Review. In a September 9, 1983 Planning Department report the following was stated:

> "Consequently, it appears that the City's current policies of restricting transit and automobile capacity into the Central Area, as essentially expressed in Section 7.2(b) and 7.5 of the Official Plan quoted above, require review and amendment if the contemplated levels of office development in the Central Area are to be realized. Such revisions are considered necessary to restore the long-run balance between the planned transportation capacity and the planned levels of development now permitted in the Central Area."

Queen alignment conforms less than other alternatives with respect to Council policy of preserving existing low rise residential neighbourhoods, as expressed in Section 1A.3 of the City of Toronto Official Plan, which states:

> "It is the policy of Council that the rate of growth in commercial offices and public institutions within the Central Core of the Central Area shall be such as to achieve the major objectives of this Plan, including ··· the retention of low rise neighbourhoods within the Central Area, ···"

B4. Borough of East York Official Plan

Bay LRT and Queen alignments do not support policies contained in the draft East York Official Plan because they cannot be practically connected to the Danforth Line at Pape. (See B4. - Eastern Section Notes).

C. ECONOMICS

C1. Capital Costs

See Appendix D.

C2. Operating Costs

See Appendix D.

C3. Savings by Removal (Reduction) of Parallel Surface Service

King-Queen-Railway-Donlands Option

- Save $4.4 M per year in operating costs as a result of service adjustments on connecting surface routes.

King-Front-Eastern-Pape Option

- Save $5.6 M per year.

Front-Eastern-Pape, and Front-Wellington-Eastern-Pape Options

- Save $2.5 M per year.

Bay LRT

- Save $3.3 M per year.

D. ENVIRONMENTAL IMPACTS

Natural

D1. Parks/Recreation Facilities

None of the alternative Central Section alignments result in long term impacts on park land.

D2. Watercourses

All alternative alignments except Bay cross Don River, which requires design for flood control.

D3. Vegetation

Little Impact.

D4. Noise

Noise levels reaching pedestrians on street are higher when generated from an elevated system compared to from underground. DRT generated noise in Central Section from either an elevated or underground alignment would not exceed existing ambient noise levels.

D5. Visual

In the Central Core, design of elevated line and stations poses an architectural challenge to aesthetically blend the system in with the architecture of such buildings as Union Station, Royal York Hotel, Dominion Federal Building. Elevated system can more readily be designed to be compatible with modern architecture such as the Convention Centre. Architectural design of buildings along the proposed Esplanade West roadway can be created in concert with the proposed elevated structure.

Social

D6. Community

All rapid transit alternatives and the Bay LRT option are generally consistent with adjacent land uses within Central Section.

D7. Housing

All alignments except Queen potentially provide service to 10,000 or more existing and proposed Central Area dwelling units within 500 m of alternative corridors. Although Queen serves the greatest number of existing dwelling units, very few new units are proposed along the Queen corridor. (See Exhibits A-6 and A-7).

D8. Development Pressures Arising From Introduction of Transit Line

Railway and Front alignments best encourage desired development of the Railway Lands. King and Wellington alignments also support this development through potential pedway connections.

Bay LRT alignment would encourage further development of the midtown area of the Central Core. Although such development may be desired, focusing development along a north-south corridor may preempt (east-west) development of the Railway Lands.

Queen alignment may encourage undesired development of existing low density residential areas such as Spadina East (bounded by Spadina, Queen, John and Dundas).

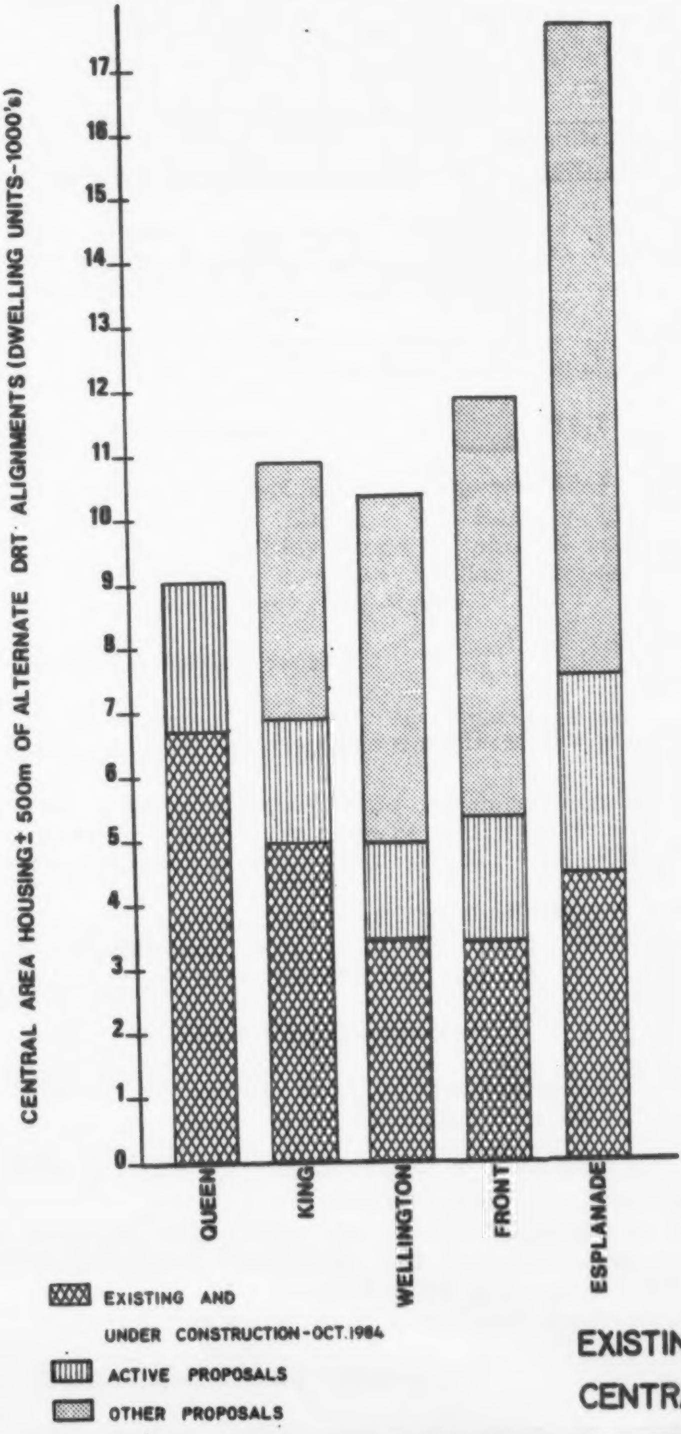
Queen and King alignments and to a lesser degree, Wellington alignments, may encourage undesired development (or redevelopment) in 'soft areas' adjacent to (east and west of) Central Core. This can be controlled through selection of station locations. For example, any concern with development pressures in the vicinity of Sherbourne Street can be avoided by not building a station in this area.

Cultural

D9. Heritage Properties

The Queen and King alignments have the greatest number of adjacent properties listed or designated by the Toronto Historic Board as being of architectural or historic significance.

Although the Front elevated alignment has fewer heritage properties along its corridor than along Queen or King, visual impact is greater because of the introduction of a continuous elevated structure and elevated stations.



EXISTING AND PROPOSED
CENTRAL AREA HOUSING

EXHIBIT A-6

TABLE A-7

COMPARISON OF EXISTING AND PROPOSED

CENTRAL AREA HOUSING

Within 500 M of Alternative DRT Corridors

Alternative Alignment	Housing (Dwelling Units)		
	Existing and Under Construction[1]	Active and Other Proposals[2]	TOTAL 500M
Queen	6,755	2,330	9,085
King	4,965	5,902	10,867
Wellington	3,443	6,941	10,384
Front	3,419	8,469	11,888
Esplanade/Railway	4,458	13,215	17,673

Source:
City of Toronto Planning and Development Department

Notes:

1. As of October 1984

2. Other proposals include Railway Lands, Harbourfront, Central Bayfront, CBC, Eaton Centre Phase 2B and other potential Central Core redevelopment.

E. IMPLEMENTATION

Availability of Right-of-Way

E1. Residential Properties

The Queen station would require demolition of row of 'cottages' on Lewis Street that were built in 1877, and other residential properties east of Broadview.

E2. Commercial/Institutional Properties

The Queen alignment requires private property (primarily commercial/industrial between Broadview and River Street, mixed commercial/residential east of Broadview to rail corridor).

The King and Wellington options impact on the underground parking garage above the University Subway line between Front and King Streets.

E3. Railway Properties

The Front alignment is on 2.6 kilometres of railway property from the Don River to Bay Street. The Railway alignment involves this 2.6 kilometres of Railway property, plus an additional 1.3 kilometres of property between Bay and Spadina proposed for dedication as the Esplanade West street right-of-way.

E4. Impact on Public Roadway

Front elevated alignment has highest impact. Columns will reduce roadspace and sight lines.

The Railway alignment has an impact on proposed Esplanade West roadway. However, this can be mitigated through road design. Esplanade West roadway is proposed to have 30 metre wide right-of-way.

Constructability

(Assuming cut and cover construction method)

E5. Public Nuisance During Construction

The public will be most inconvenienced by routes adjacent to public buildings, shopping areas, hotels and theatres.

Queen, King and Front Street alignments with abutting property areas that include major shopping areas, theatres, hotels and convention facilities will create the greatest inconvenience to the public during construction. Wellington and Bay alignments would provide a lesser degree of public inconvenience and the Railway option through the Railway Lands would result in negligible inconvenience to the public.

E6. Traffic Impact During Construction

The greatest traffic impact will occur on streets that include major transit services, parking and delivery access, and two-way vehicular traffic. Traffic volumes are shown in Exhibit A-8.

Queen, King and Bay Streets involve major transit services and two-way vehicular traffic. Wellington is a major access street for parking and delivery access to downtown buildings. However, the one-way vehicular traffic on Wellington provides staging opportunities that can mitigate some of the traffic impact of construction within the street allowance.

E7. Utility Impact During Construction

Construction of underground transit facilities requires significant utilities relocation and consolidation.

Underground construction on Front Street requires relocation of an interceptor sewer and steam line.

At grade construction along Railway between Don River and Lower Sherbourne requires reconstruction of high voltage transmission towers along the south edge of the railway corridor.

E8. Ease of Construction

Underground construction in a downtown urban environment is significantly more difficult than is elevated or at grade construction in terms of utilities reloaction; maintaining deep trenches; underpinning buildings, existing subways and underground pedestrian connections; maintaining surface auto and transit operations; and maintaining access to adjacent private property.

E9. Dependency on Undertakings by Others

The Railway alignment is dependent on the City of Toronto to complete and obtain City Council approval and Metro support for their Part II Official Plan for the Railway Lands; the Railway's moving of storage track and consolidating the rail corridor; TTC securing an agreement with the Railways for dedication of the required transit right-of-way; and a Province of Ontario decision regarding the proposed GO ALRT Lakeshore system.

E10. Exposure to Sensitive Impact Area

King*

Lewis and Queen Street East area. Proposed underground station location is approximately 60 metres south of Queen Street East in low density residential and mixed commercial-residential area.

Sherbourne and King Street East area. Proposed underground station location is in low to medium density commercial land use zone. Potential for redevelopment in immediate area may be restricted by heritage buildings.

Front Elevated*

Union Station area. Proposed elevated station location is compatible with Union Station use, but will produce adverse aesthetic impacts on Royal York Hotel and surrounding area.

Railway*

Lower Sherbourne and CN Kingston line area. Proposed at-grade station is located south of medium density residential areas (St. Lawrence District). Any direct impacts will be mitigated by the width of the rail corridor.

Flexibility

E11. Staging Opportunities

All Central Section DRT options can be constructed with a first phase connecting the Danforth Subway line to the downtown. Extensions north of Danforth and west of Spadina can be constructed as later stages.

The concept of staging is not applicable for the Bay LRT option which is proposed to be constructed from the Bloor Subway to Union Station in one stage with no opportunities for extension.

E12. Alignment Geometry

The alternative alignments adjacent to the rail corridor (Front alignments along railway east of Bay and Railway alignment) are constrained the most in terms of flexibility of grade and horizontal curve radii because of tight property limitations. Provision for possible joint use with GO ALRT introduces further limits on grade and alignments.

E13. Yard Locations

All Central Section DRT alternatives except Queen, can access yards associated with either of the three Eastern Section alignments - Don Valley, Pape-Eastern, and Donlands-Railway. The Queen alignment cannot practically be connected with the Pape-Eastern alternative, and therefore, connection to the Danforth at Pape is not possible.

The Bay LRT option does not have a storage and maintenance yard directly associated with it, and would require use of existing (or expanded existing) streetcar barns if LRT technology is adopted. No potential sites have been identified for subway storage and maintenance if subway technology is to be considered for the Bay route.

E14. Opportunities for Extension

All of the Central Section DRT alternatives except Queen, can be potentially extended west to serve Exhibition Place.

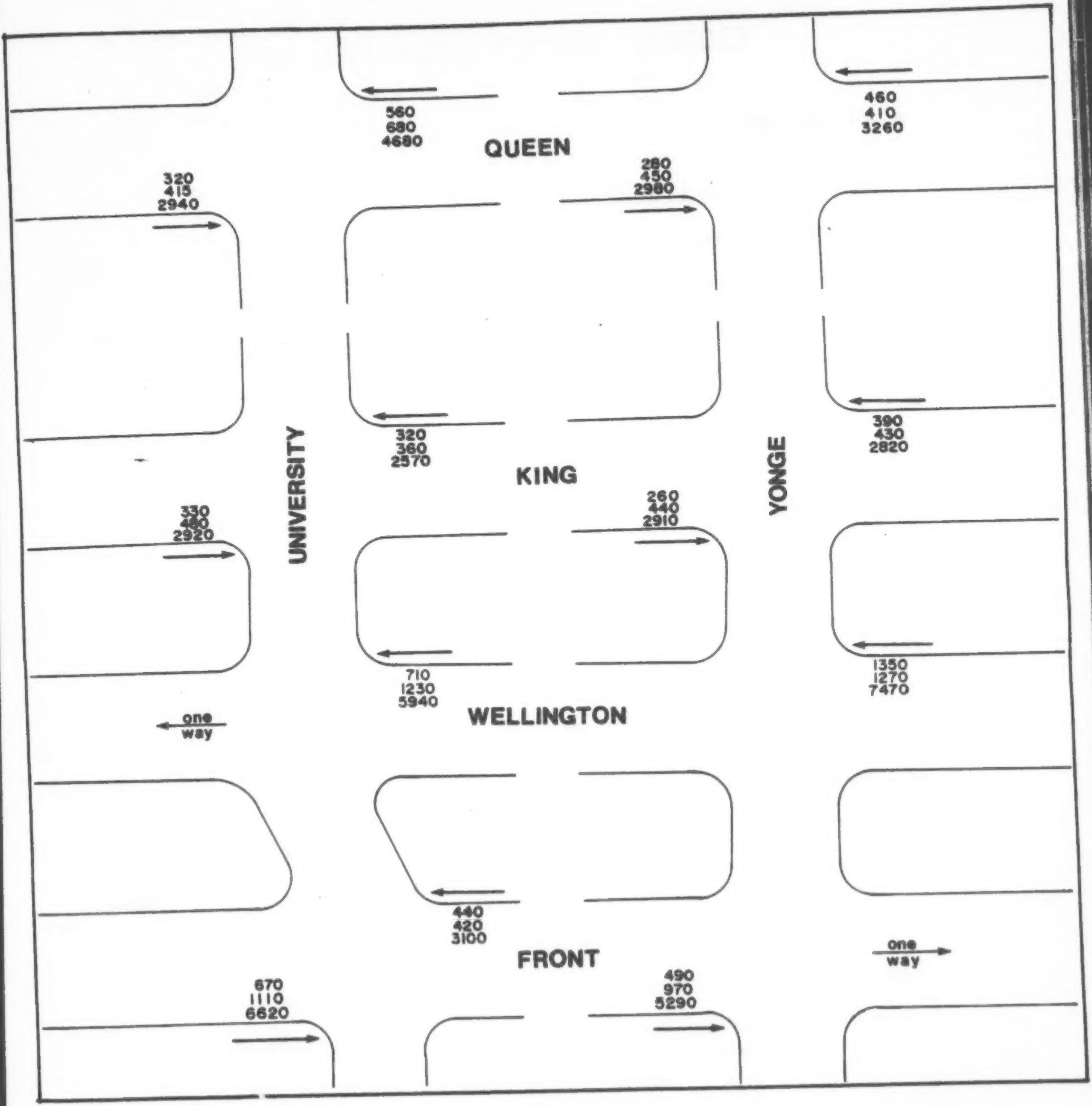
All DRT options can be extended further west and north to connect with the Bloor line and ultimately to Eglinton West, and can be extended north of Danforth to Eglinton East.

* SOURCE: TTC, DRT Environmental Impact Evaluation, October 1984.

EXHIBIT A-5

Extension of the Bay LRT north of Bloor is not practical because:

- it would require constructing the line below the existing Bloor-Danforth subway, which is already two track levels deep (wye connection to University line);
- area that would be served by such an extension is presently well served by Yonge and Spadina subway lines;
- right-of-way for an extension beyond Davenport would require acquisition of private property and demolition of existing buildings.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WELLINGTON
one way
440
420
3100
FRONT
one way
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970
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am peak hour
pm peak hour
8 hour total
(rounded to nearest 10)

AUTOMOBILE VOLUMES
A.M. & P.M. PEAK HOURS, 8 HOUR TOTAL

EXHIBIT A-8

EASTERN SECTION EVALUATION MATRIX NOTES

A. TRANSIT SERVICE

A1. Trip Diversion Potential (Exhibit A-1)

Based on diversion analysis of existing (1984) subway ridership:

The highest trip diversion potential exists for a connection to Broadview Station followed by a Pape Station connection, with the lowest potential measured for a Donlands connection to the Danforth Subway.

A2. Service to East Toronto

Don Valley alignment results in inconvenient transfer with east-west streetcar lines (from bridge to underground station). Practically downtown (seven minutes to Yonge Street) at the point of transfer.

Pape and Donlands alignments allow transfer from Queen 501, 502 and King/Wellington 503, 504 for east Toronto residents before reaching bottleneck at Broadview.

A3. Service to Major Traffic Generators

Don Valley - No major generators served.

Pape and Donlands options both serve shopping plazas in vicinity of Pape /Gerrard.

Pape additionally serves designated District Commerce Centre at Pape/Danforth.

A4. Integration with Existing Transit

All options connect with east-west streetcar services.

Pape additionally connects with established high volume bus corridor (with reserved lanes) feeding Pape Station.

A5. Integration with Proposed Transit

Donlands/Railway offers potential connection with proposed GO ALRT joint use station at Queen.

B. LONG TERM POLICY COMPLIANCE

B1. TTC Long Range Plan

See Central Section Notes B1.

B2. Metro Official Plan

See Central Section Notes B2.

B3. City Official Plan

See Central Section Notes B3.

B4. East York Official Plan

Connection of DRT line to Danforth Subway at Pape Station (Pape-Eastern alignment) preferrence of East York.

Section 23.4 of the draft Official Plan states:

> The proposed Downtown Rapid Transit line shown on Map 2 is strongly supported by East York. Its approval and construction by Metropolitan Toronto is encouraged and accommodated in the following respects:
>
> a) Its extension through East York, serving the Primary Centre, as part of the first stage of construction of the rapid transit facility;
>
> b) Preferred alignment along the general route of Pape Avenue, the Millwood Road bridge and Overlea Boulevard, with stations serving existing and future concentrations of demand, including Pape and Cosburn Avenues and the Primary Centre in the Thorncliffe Park Area.

Economics

C1. Capital Costs

See Appendix D.

C2. Operating Costs

See Appendix D.

C3. Savings by Removal of Parallel Surface Routes

None of the Eastern Section alternatives parallel major surface routes, therefore, no savings can be derived (nor resulting duplication of service). See also Central Section Notes C3.

D. ENVIRONMENTAL IMPACT

Natural

D1. Parks/Recreation Facilities

Don Valley may have adverse impact on environmentally sensitive parkland, especially north of Bloor.

Donlands/Railway to Don impacts McCleary Park at Queen Street East and McGee Street.

Donlands/Railway, both to Don and to Queen, impact parkette at Gerrard Street and Rail corridor, and impact Jimmie Simpson Community Centre/Park.

Pape/Eastern - No adverse impacts on parks.

D2. Water Courses

Don Valley option would cross underneath Don River south of Bloor Viaduct and crosses over top Don River at two locations north of Bloor.

D3. Vegetation

Cut and cover construction method on Pape Avenue may necessitate removal of many mature trees on narrow residential section between Gerrard and Queen Streets.

Donlands/Railway alignment may cause removal of some (screening) vegetation along rail corridor.

Don Valley option would likely require removal of natural parkland vegetation and trees.

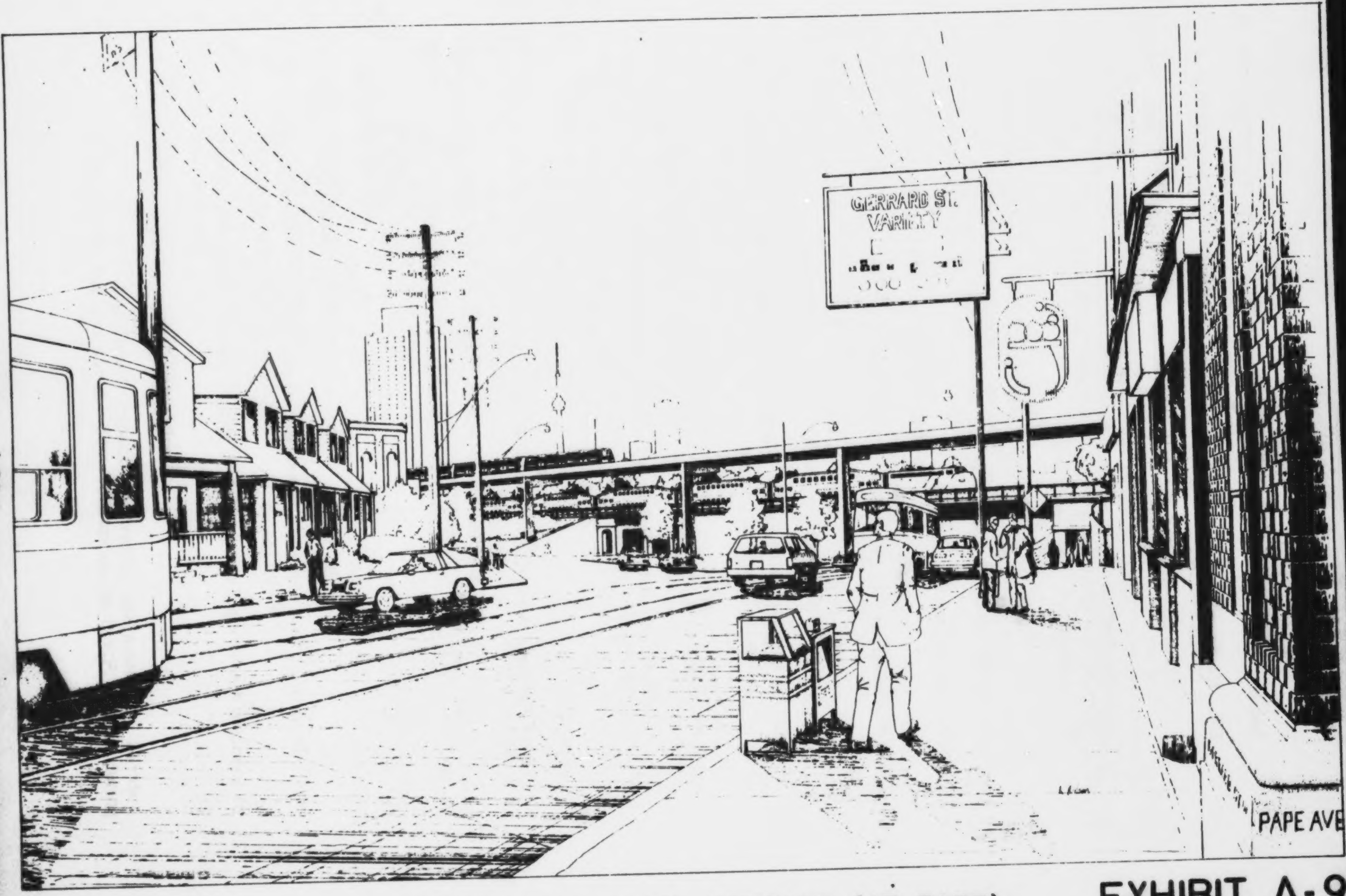
D4. Noise

Receiver location at Wardel Avenue (adjacent to railway north of Queen), one of only two locations where DRT generated noise levels are expected to exceed existing background noise. (Other location in West Leg Section).

(Vibration) - May be a nuisance to residents on Pape Avenue. Attenuation measures should be specified.

D5. Visual

Elevated sections of Donlands/Railway alignment may create a visual barrier in some locations; however, not as severe as along Front Street in the Central Section. (See perspective drawing - Exhibit A-9)


GERRARD ST.
VARIETY
PAPE AVE

LOOKING WEST ON GERRARD (AT PAPE)

EXHIBIT A-9

Social

D6. Community

All alignments are generally consistent with adjacent land uses. Section of Pape-Eastern alignment, however, does not follow established rail transportation corridors as do the Don Valley and Donlands/Railway alignments.

D7. Housing

Don Valley route generally does not serve adjacent residential areas (except at Broadview), whereas Pape/Eastern and Donlands/Railway generally serve low to medium density residential areas.

D8. Development Pressures

Don Valley encourages development in high density residential area at Broadview/Danforth.

Pape/Eastern encourages development at designated District Commerce Centre at Pape and Danforth.

No similar policy consistent development locations along Donlands/Railway alignment.

Donlands/Railway may encourage undesired development at Donlands/Danforth, which is predominantly low density residential.

All options may tend to encourage undesired development in vicinity of other station locations.

Cultural

D10. Heritage Properties

None of the alignments adversely impact the few heritage properties adjacent to the alternative routes.

E. IMPLEMENTATION

Availability of Right-of-Way

E1. Residential Properties

Donlands-Railway option will require some private residential property adjacent to rail corridor for cantilevered structure column placement (3-4 m wide corridor) and in vicinity of Greenwood Yards for connection to Donlands Station.

Don Valley does not require residential property.

Pape requires a few residential properties in vicinity of Pape and Eastern Avenues for access to proposed yard.

E2. Commercial/Institutional Properties

Donlands-Railway option may require some commercial property adjacent to railway (same as E1. above).

Pape/Eastern requires purchase of private property for yard site.

Don Valley route requires purchase of Toronto Brickyard site for yard.

E3. Railway Properties

Donlands-Railway alignment adjacent to 2 kilometre section of railway property to Queen, and a further 0.7 kilometres if it continues along railway to Don River.

E4. Impact on Public Roadways

No long term road impacts.

Pape-Eastern to be constructed entirely under public roadways. Pape is a Metro Road north of Gerrard Street. Pape, south of Gerrard Street, and Eastern Avenue are City of Toronto roads.

Don Valley to be constructed mostly below the Bayview Avenue Extension, which is a Metro road.

Constructability

E5. Public Nuisance During Construction

Pape/Eastern - High degree of public nuisance to residents of Pape Avenue by assumed cut and cover construction method.

Donlands/Railway - Some degree of nuisance to land owners adjacent to rail corridor.

E6. Traffic Impact During Construction

Don Valley - Significant impact on traffic operations on Bayview Extension by cut and cover. Some disruption to D.V.P. traffic during construction of underground and elevated structures crossing D.V.P. in vicinity of Bloor Viaduct. If the Don Valley route is selected, there may be an opportunity to construct it concurrent with proposed Bayview widening.

Pape/Eastern - Pape would require traffic restrictions between Gerrard and Queen and traffic operations on Eastern Avenue would be affected.

E7. Utility Impact During Construction

Pape/Eastern - Typical utilities relocation required along Pape and Eastern Avenues (sewers, water and gas mains, etc....).

Don Valley - Minimal utilities in Valley.

Donlands/Railway - Minor low voltage hydro line.

E8. Ease of Construction

Don Valley - Requires cut and cover in the Valley and below the Don River. Poor soil conditions are anticipated.

Pape/Eastern - Requires cut and cover along urban roadways (with above mentioned typical utilities relocation).

Donlands/Railway - Construction of elevated systems generally are relatively easy compared to underground. However, access to construction site along rail corridor may be difficult.

E9. Dependency on Undertakings by Others

Donlands/Railway dependent upon Ontario Government decisions regarding the proposed GO ALRT Program.

E10. Exposure to Sensitive Impact Areas

Don Valley

Exposure to environmentally sensitive natural open space area. Area subject to flooding and errosion (regulated by Metro Toronto and Region Conservation Authority).

Donlands/Railway*

Donlands and Danforth area. Transfer station to Danforth subway line will provide some impetus for intensified mixed commercial residential land use, depending upon zoning. Proximity of Wilkinson Public School may require special road vehicle/pedestrian traffic controls.

Low density residential areas adjacent to south side of rail corridor may be sensitive to aesthetic impacts.

Pape/Eastern*

Pape and Danforth area. Transfer station to Danforth subway line will provide some impetus for mixed residential-commercial land use, consistent with present designation as district commerce centre.

* Source: TTC, DRT Environmental Impact Evaluation, October 1984

Pape Avenue between Austin Avenue and Queen Street East. Pape Avenue in this residential area is relatively narrow (appproximately 3.2 to 3.5 metres). Five of the sidestreets (east side of Pape) are less than a block long with no exit. A community health centre and ambulance station is located at 126 Pape Avenue. Depending upon the method of alignment construction, disruption of local street traffic could be temporarily severe.

Flexibility

E11. Staging Opportunities

Pape/Eastern and Donlands/Railway can be staged to initially terminate at Danforth.

Don Valley cannot be staged to Danforth. It requires staging to at least Brickyard site (Bayview south of Pottery Road).

E12. Alignment Geometry

Donlands/Railway above grade alignment along rail corridor generally more constrained in terms of design flexibility than either the Don Valley or Pape-Eastern routes.

E13. Yard Locations

Don Valley - Availability of Brickyard site not certain. Borough of East York presently is considering an application for a major commercial/residential development on the site.

Pape/Eastern route (because of requirements for yard access) cannot connect with the Queen option in the Central Section.

Donlands/Railway route has the flexibility of connecting with any of the alternative alignments in the Central Section. Use of Greenwood Yards for storage of DRT vehicles, however, will require transferring some existing subway car storage to another site (probably Westwood Theatre site at Kipling/Bloor/Dundas).

E14. Opportunities for Extension

All options can ultimately be extended north of Danforth to Don Mills-Eglinton.

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DOWNTOWN [illegible] TRANSIT STUDY

Task Report 13A ENVIRONMENTAL IMPACT EVALUATION

[illegible]

Toronto Transit
Commission

DOWNTOWN RAPID TRANSIT STUDY

Task Report 120 ENVIRONMENTAL IMPACT EVALUATION

Volume I SUMMARY

ENGINEERING DEPARTMENT
October 1984

8-1

VOLUME I - SUMMARY

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VOLUME I - CONTENTS (Cont'd)

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1.0 PROJECT DESCRIPTION

The Downtown Rapid Transit (DRT) Line Feasibility Study was authorized on June 21, 1983 by Metro Toronto Council. The study is being undertaken jointly by the Metro Planning and Roads and Traffic Departments and by the Toronto Transit Commission (TTC). Overall objectives of the study include the definition of station locations and right-of-way requirements for a U-shaped rapid transit line running from the Danforth subway line to the Bloor subway line and providing accessibility to the Financial District, Railway Lands, and Exhibition Place.

Provision is to be made for an ultimate line capacity of 20,000 persons per hour per direction. An evaluation of steel wheel on steel rail technologies suitable for use on the DRT line has not been completed. At the time of writing, the most likely candidate technology appeared to be a "stretched" version of Intermediate Capacity Transit System (ICTS) vehicles. Electrical power could be supplied to the vehicles by conductor rails or overhead pick-up. ICTS technology (Appendix A) would permit construction of underground, surface, and elevated alignments. Therefore, this report is being prepared with the assumption that ICTS technology will be used.

Alternate alignment and station locations evaluated in this report are described by Table I.1-1. These descriptions were based largely on April 1984 Preliminary drawings. For the environmental impact evaluation report, the alignments were considered as various segments that could be compared with each other (where specific alternatives exist) and that could be linked together to provide a route from the Danforth subwayline in the east to the Bloor subway line in the west via the lower Downtown Core.

Previous studies have concluded that the DRT line would require separate vehicle storage and equipment and plant maintenance facilities. Two rail yard sites have been identified, one at the existing TTC Greenwood subway yard and one at 629 Eastern Avenue south of Pape Avenue. The Greenwood option consists of enlargement of the present subway yard and displacement of some of the subway yard facilities to a new subway site at Kipling Avenue and Bloor Street. The Eastern Avenue option consists of construction of a new ICTS yard at the former site of a steel fabricating facility.

Implementation schedules and capital cost estimates for the DRT project will be part of the feasibility study. Construction methods are not being considered during the DRT Line Feasibility Study, and no geotechnical investigations are being undertaken.

TABLE I.1-1 Description of DRT Alignment and Station Alternatives (See Figure III.1-1)

Alignment Name	Horizontal Definition	Length (kilometres)	Vertical Definition	Station Locations
Eastern Section				
Donlands Option	Donlands subway station to intersection of Pape Ave. and CN Kingston line (following south side of rail corridor).	2.0	Underground to portal at Shudell Ave. west of Greenwood Yard then elevated to Pape Ave. via Rail Corridor.	- Donlands subway station - Pape Ave. and Gerrard St. East
Pape Option	Pape Ave. from Pape subway station to CN Kingston line.	1.5	Underground.	- Pape subway station - Pape Ave. and Gerrard St. East
Rail - Pape to Queen East Option	CN Kingston line (south side) from Pape Ave. to Queen St. East.	1.2	Elevated to Dundas St. East, then at-grade to Queen St. East (except King Option with portal opposite Simpson Park).	None (see above).
Pape - Eastern Ave. Option	Pape Ave. from CN Kingston line to Eastern Ave., then along Eastern to CN Kingston line.	2.0	Underground/Elevated	- Pape subway station - Pape Ave. and Gerrard St. East - Pape Ave. and Queen St. East
Central Section				
King Option	East from CN Kingston line to King St. East, King St. to Spadina Ave., Spadina to Front St. West, Front St. and north side of CN Oakville line to just west of Tecumseth St.	5.7	Underground to portal at Jenkins Ave., elevated across Don Channel to portal at River St., underground to Front St. West, elevated to Tecumseth St.	- Just south of Lewis St. and Queen St. East - Sherbourne St. and King St. - King subway station - St. Andrew subway station - Spadina Ave. and Wellington St. West - Bathurst St. and Front St. West
Front Option	South side of CN Kingston line from Queen St. East to Don Channel, along Front St. to Bathurst St., north side of CN Oakville line to just west of Tecumseth St.	5.7	Elevated (including sections elevated above rail corridors).	- McGee St. and CN Kingston line. - Sherbourne and Front Sts. - Union Station - Just east of John and Front Sts. - Spadina Ave. and Front St. - Bathurst and Front Sts.

TABLE I.1-1 (Continued)

Alignment Name	Horizontal Definition	Length (kilometres)	Vertical Definition	Station Locations
Front Options (Cont'd)				
- Wellington Option	Wellington St. from Front St. to Spadina Ave., along Spadina to Front.	2.0	Underground.	- Yonge and Wellington Sts. - University Ave. and Wellington St. - East side of Clarence Square.
Rail Options				
- Rail - Queen East to Jarvis	South side of CN Kingston line from Queen St. East to just west of Jarvis St.	2.9	Elevated above rail corridor to CN Don Sorting Yard, at-grade to just west of Jarvis St.	- McGee St. and CN Kingston line - Lower Sherbourne St. and rail corridor
- Front Option	CN Kingston line to Front St., along Front St. and north side of CN Oakville line to just west of Tecumseth St.	3.0	Underground between portals east of Cooper St. and west of Spadina Ave., then elevated to just west of Tecumseth St.	- Union Station - Just east of John and Front Sts. - Spadina Ave. and Front St. West - Bathurst St. and Front St. West
- Railway Lands Option	South side of CN Kingston line to Railway Lands, through Railway Lands via proposed Esplanade West roadway, across CN Oakville line to just west of Tecumseth St.	2.7	At-grade to Freeland St., elevated through Railway Lands.	- Union Station - Spadina Ave. and Esplanade West - Bathurst St. and Esplanade West
Rail - Tecumseth to Atlantic	North side of CN Kingston line from just west of Tecumseth St. to Atlantic Ave.	1.2	Elevated above rail corridor.	- Just east of Atlantic Ave. and rail corridor.
Western Section				
Weston Line Options				
- Jefferson Option	Atlantic Ave. to CN Weston line via Jefferson, then along north side of rail corridor to Queen St. West.	1.1	Elevated to rail corridor portal, then underground to Queen St. West.	None
- Dufferin Option	North side of CN Oakville line from Atlantic Ave. to Dufferin St., then north along Dufferin to CN Weston line.	1.4	Elevated to Thorburn portal at Liberty St., underground to Queen St. West.	None

TABLE I.1-1 (Continued)

Alignment Name	Horizontal Definition	Length (kilometres)	Vertical Definition	Station Locations
Western Section (Cont'd)				
- Rail - Queen West to Bloor	North side of CN Weston line from Queen St. West to GO Station at Bloor St. West.	2.5	Underground to portal at Dundas St. West, then at-grade to Bloor subway line.	- Dufferin St. north of Queen St. West and Rail corridor - Lansdowne Ave. and rail corridor - Rail corridor and Bloor St. West
Roncesvalles/Parkside Options				
- Rail - Atlantic to Roncesvalles	North side of CN Oakville line from Atlantic Ave. to Roncesvalles Ave.	2.3	Elevated/at-grade	- Jameson Ave. and rail corridor.
- Roncesvalles Option	Roncesvalles Ave. and Dundas St. West from CN Oakville line to Dundas subway station.	2.2	Underground from portal at Queen St. West and Rail corridor to Dundas subway station.	- Roncesvalles and Grafton Aves. - Roncesvalles and Westminster Aves. - Dundas subway station.
- Parkside Option	North side of CN Oakville line from Roncesvalles to High Park, then along eastern edge of High Park to Keele subway station.	2.6	Elevated.	- Roncesvalles Ave. and The Queensway/King St. West/ Queen St. West - Parkside Dr. and The Queensway. - Parkside Dr. and Westminster Ave. - Keele subway station

2.0 EXISTING ENVIRONMENT AND FUTURE URBAN DEVELOPMENT

All DRT alignment and rail yard alternatives are located within the City of Toronto, which in turn is located within the Municipality of Metropolitan Toronto. Toronto was founded as the Town of York, which was laid out on a military grid system in the late 1700's and 1800's in the area bounded by Queen, Front, Parliament and Peter Streets. The DRT alignment areas were largely developed by the end of World War II and the overall pattern of streetscape is a highly urbanized rectangular grid broken by the diagonally trending railway lines and sections of the Lake Shore.

The chief natural features of the City of Toronto as designated by the City Official Plan (April 1981) are the Lake Shore, Toronto Islands, ravines, and the glacial Lake Iroquois bluff located north of Davenport Road. None of these features are adjacent to DRT alignment or rail yard alternatives. One surface water course, the Don River Channel, would be crossed by all of the alignments and only one major open space area, High Park, potentially could be affected by the DRT project.

All DRT Central Section alignments cross the lower part of the Central Core, which contains major offices of national financial institutions, offices of the municipal and provincial governments, and the primary regional centres of retailing and entertainment. East and west of the Central Core are a variety of less intensely developed residential, commercial, and industrial areas.

The existing transportation system consists mainly of roadways, commuter rail lines, and subway lines. This system is used to its maximum capacity for only about four hours each day, Monday to Friday. During these peak periods, the work trip to and from Downtown office locations is the major generator of traffic.

Municipal policies in the 1970's were to deconcentrate commercial office development away from the Central Core have had significant results. As a result, considerable redevelopment potential exists in the Downtown area. Employment structure and other trends in both the Metro Region and the City, but particularly in the City, indicate that the main focus of redevelopment in the Downtown area will be for office space. Transit demand forecasts indicate that serious overcrowding conditions will exist on the Yonge and University subway lines by the early to mid-1990's.

3.0 GENERAL PROJECT ENVIRONMENTAL IMPACTS

General, potential environmental impacts of the DRT project are summarized in Table I.3-1. These impacts, listed separately for the pre-construction, construction, and operation stages of the project, may occur irrespective of the characteristics of the individual alignment, station, and rail yard alternatives. Possible mitigation measures for the impacts are not necessarily considered by Table I.3-1, but are discussed in the body of the report.

The prediction of impacts has been limited in scope to that of a feasibility study. Experience with intermediate capacity rapid transit systems is relatively new, and impact prediction will improve with operation of the new generation of facilities such as the Scarborough Rapid Transit line.

Transportation facilities such as roads, highways, railway lines, and rapid transit lines are dominant elements in all large cities. Thus, the construction of a new rapid transit line is expected to have significant environmental impacts. Most of the long-term impacts, with suitable mitigation, may be regarded generally as being beneficial.

Pre-construction stage impacts of the DRT project are expected to be minor and restricted to a small number of socio-economic categories. Construction stage impacts will depend upon construction methods and implementation schedules. These impacts will be major but temporary in most categories. Operation stage impacts will be most significant on the land use and transportation system categories. Transportation system impacts are being evaluated in detail by other DRT task groups.

Land use impacts adjacent to the alignments (excluding station locations) are expected generally to be minor because the alignment alternatives typically follow rail, arterial road, or multi-use transportation corridors or are underground. Thus, the most significant potential land use impacts will occur within the station catchment areas and will consist of associated development/redevelopment. These indirect impacts are only potential impacts because the amount, type, pattern, and timing of development will depend upon many factors such as capacity of the DRT line, general economic and real estate market conditions, development costs, land use zoning, and planning coordination.

TABLE I.3-1 General DRT Line Environmental Impacts

Main Impact Category	Impact Sub-Category	Pre-Construction Stage Potential Impacts	Construction Stage Potential Impacts	Operation Stage Potential Impacts
Natural Environment				
Physical	Micro-Climate and Air Quality	None	Loss of windbreaks, dust, engine exhausts.	Wind, snow accumulation and sun shadow patterns adjacent to elevated structures and where mature trees removed, removed, general transportation air pollution levels, bus exhausts at stations.
	Geology and Soils	None	Minor sediment erosion where cover stripped, foundation instabilities, exposure of contaminated soils, depletion of earth resources.	None
	Drainage and Water Quality	None	Negligible to minor increase in suspended load of drainage systems, petroleum product and salt spills, dewatering contaminated groundwater.	None
Biological	Vegetation	None	Removal of grass, shrubs, trees, revegetation with landscaping.	Habitat changes from shading by elevated structures.
	Wildlife	None	Loss of foraging areas and cover, general disturbance.	Potential bird disturbance in High Park.
Social Environment				
Municipal Official Plans	Metro and City of Toronto	Amendments	Amendments	Amendments
Land Use	General	Minor changes in anticipation of later impacts.	Displacement of existing uses (particularly at station locations).	Potential redevelopment (depending upon other factors) including potential higher use densities around some station locations.
Transportation Systems	General	None	Temporary disruption and diversion.	Modal split and transportation energy use mix. See natural environment for air pollution.
	Roadways and Railways	None	General construction impacts plus dislocation of parking, potential street width and traffic control changes, potential relocation of tracks.	Reduced roadway congestion, potential increased traffic control adjacent to exclusive rights-of-way, decreased rail expansion potential where shared with

TABLE I.3-1 General DRT Line Environmental Impacts (Cont'd)

Main Impact Category	Impact Sub-Category	Pre-Construction Stage Potential Impacts	Construction Stage Potential Impacts	Operation Stage Potential Impacts
Social Environment (Cont'd)				
Transportation Systems (Cont'd)	Transit	None	General construction impacts.	New catchment areas, revised surface transit routes, reduced congestion and travel times, increased capacity and usage.
	Pedestrian and Bicycle Path Linkages	None	General construction impacts.	Sidewalk narrowing where elevated along streets, enhanced function of Downtown pedestrian mall system.
Visual Aesthetics	-	None	Temporary and permanent additions and deletions to landscape (structures and vegetation), night lighting, temporary loss of privacy.	Scale and shape alterations to landscape where above ground, new views to and from facility, night lighting, potential loss of privacy.
Noise and Vibration	-	None	Temporary increase in ambient levels with potential impacts on people, structures, and certain equipment.	Potential minor increase in ambient noise levels in rail corridors between Dundas St. East and Eastern Ave. and between Dundas St. West and Bloor St. West.
Miscellaneous	Public and Employee Safety	None	General construction site impacts, potential traffic conflicts.	General transit impacts.
	Utilities	None	Temporary disruptions, temporary and permanent relocations.	Provision of electricity to facility, any redevelopment impacts.
Cultural Heritage				
Landscapes and Features	-	Potential designation in anticipation of project impacts.	Potential temporary disruption of view or usage, property displacement.	Potential alteration of views by elevated sections, improved tourist access.
Archaeology	-	Potential designation in anticipation of project impacts, exploration, survey, or field work.	Discovery of remains, potential disruption of archaeological dig and DRT project schedules.	None
Economic				
Property Values and Ownership	-	Potential minor speculation, property acquisition and easements for facility.	Potential minor speculation, temporary construction easements.	Potential minor changes in values around stations, particularly with any rezoning or redevelopment.

TABLE 3-1 General DRT Line Environmental Impacts (Cont'd.)

Main Impact Category	Impact Sub-Category	Pre-Construction Stage Potential Impacts	Construction Stage Potential Impacts	Operation Stage Potential Impacts
Economic (Cont'd.)				
Local Income and Municipal Finances	-	Design costs.	Construction costs, municipal and provincial budgets, potential minor impacts with any changes in property assessments or commercial revenues.	Operation and maintenance costs, municipal and provincial budgets, new tax assessment and income from any related redevelopment.
Employment	-	Minor increase during feasibility and design studies of facility.	Temporary major increase.	Minor increase to operate and maintain facility plus any induced employment.

4.0 ENVIRONMENTAL IMPACT EVALUATION OF DRT OPTIONS

An overall environmental impact evaluation of the DRT options is presented in Table I.4-1. The impact evaluation rating that is shown is based on a discussion (Vols. II & III) of significant potential impacts for each alternative. Some of the key considerations in the rating are summarized in Tables I.4-2 through I.4-5. The purpose of the rating was to identify and summarize broad impact issues.

Social environment issues are expected to predominate over other impact types. Land use impacts were considered largely with respect to option compatibility with existing or proposed uses. Evaluation of the "do nothing" alternative is beyond the scope of this study, and so no rating was applied to the general project impact of providing increased rapid transit capacity to the Downtown Core. Noise impacts are expected to be minor, however, the noise and aesthetic rating will depend upon the aesthetic impact which is based on the grade and land use character of the alignment.

At this stage of the project, expected impacts on the natural environment are related largely to sun shadows produced by elevated guideways. Geotechnical issues may become significant during design investigations.

Impacts on the cultural heritage environment were rated mainly by potential aesthetic impacts. Very few heritage properties will be threatened with displacement or alteration. Archaeological impacts, particularly for the King and Underground Front options, may become more significant with any archaeological exploration work.

Based on available information at the time of writing and the environmental impact evaluation used in this report, the most advantageous alignments appear to be the following:

Eastern Section -	Combined Pape and Rail-Pape to Queen options
Central Section -	King option or combined Rail-Queen to Jarvis and Underground Front options
Western Section -	Combined Rail-Atlantic to Roncesvalles and Roncesvalles options

The above selected alignment options, where located, appear to have the least effects on the natural, social (including noise & vibration and aesthetics) and cultural heritage environments.

These observations are preliminary in nature and, of course, may change with a further evaluation of all the factors that would influence the decision of arriving at the preferred alignments. These evaluations will be done by the DRT Task Group.

TABLE I.4-1 Summary of Environmental Impact Evaluation of DRT Options

DRT Option	Natural Environment	Social Environment			Cultural Heritage Environment	Economic Environment
		Land Use	Transportation	Noise and Aesthetics		
Eastern Section						
Donlands Option	+	0	?	+	+	?
Pape Option	+	+	?	+	+	?
Rail-Pape to Queen Option	0	+	?	0	+	?
Pape-Eastern Option	+	0	?	+	+	?
Central Section						
King Option	+	+	?	+	+	?
Front Options - Elevated Front	-	+	?	-	-	?
- Underground Wellington	0	+	?	0	0	?
Rail Options - Rail-Queen to Jarvis	+	+	?	+	+	?
- Underground Front	+	+	?	+	+	?
- Railway Lands Option	0	+	?	-	+	?
Rail-Tecumseth to Atlantic	+	+	?	+	+	?
Western Section						
Weston Options - Jefferson Option	+	0	?	+	+	?
- Dufferin Option	0	-	?	+	+	?
- Rail-Queen to Bloor	+	+	?	+	+	?
R'valles/P'side Options - Rail-Atlantic to R'valles	+	+	?	+	+	?
- Roncesvalles Option	+	+	?	+	+	?
- Parkside Option	-	-	?	-	+	?
Rail Yard Alternatives						
Greenwood Option	+	+	?	+	+	?
Eastern Ave. Option	+	0	?	+	+	?

NOTES: Ratings are based on relative, overall advantages (+), disadvantages (-), or neutrality (0) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts to be evaluated following completion of other task reports. Evaluation assumes operation of "stretched" ICTS vehicles.

TABLE I.4-2 Environmental Impact Evaluation of Eastern Section Options

Impact Category	Donlands Option	Pape Option	Rail-Pape to Queen Option	Pape-Eastern Ave. Option
Natural Environment	+ No major impacts foreseen.	+ No major impacts foreseen.	0 Shadow impacts will depend on alignment grade.	+ No major impacts forseen.
Social Environment - Land Use	0 Station locations less consistent with land use than Pape Option.	+ Both stations are within district commerce centres.	+ Alignment is within rail corridor.	0 Alignment is underground.
- Transportation	? TBE Tasks 113, 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.	? TBE Tasks 113, 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.
- Noise and Aesthetics (2)	+ Alignment is underground or within rail corridor.	+ Alignment is underground.	+ Will depend on alignment grade at Dundas St. and Simpson Park.	+ Alignment is underground.
Cultural Heritage Environment	+ No known features.	+ No impacts foreseen.	+ No impacts foreseen.	+ No impacts foreseen.
Economic Environment	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.

NOTES: (1) Ratings based on relative, overall advantages (+), disadvantages (-), or neutrality (0) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts To Be Evaluated (TBE) following completion of indicated task reports.

(2) Noise evaluation assumes operation of "stretched" ICTS vehicles.

TABLE I.4-3 Environmental Impact Evaluation of Central Section Options

Impact Category	King Option	Elevated Front Option	Underground Wellington Option
Natural Environment	+ No major impacts foreseen.	- Major sun shadow impacts along Front St.	O Sun shadow impacts east of Church St.
Social Environment - Land Use	+ Generally compatible with existing and proposed future uses.	+ Generally compatible with existing and proposed future uses.	+ Generally compatible with existing and proposed future uses.
- Transportation	? TBE Tasks 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.
- Noise and Aesthetics (2)	+ Alignment is mainly underground.	- Major visual aesthetic impacts along Front St.	O Aesthetic impacts east of Church St.
Cultural Heritage Environment	+ Although alignment is underground, some features may be affected.	- Major visual aesthetic impacts.	O Aesthetic impacts east of Church St.
Economic Environment	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.

NOTES: (1) Rating based on relative, overall advantages (+), disadvantages (-), or neutrality (0) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts To Be Evaluated (TBE) following completion of indicated task reports.

(2) Noise evaluation assumes operation of "stretched" ICTS vehicles.

TABLE 1.4-3 Environmental Impact Evaluation of Central Section Options (Cont'd)

Impact Category	Rail-Queen East to Jarvis	Undgerground Front Option	Railway Lands Option	Rail-Tecumseth to Atlantic
Natural Environment	+ Potential minor shadow impacts.	+ No major impacts foreseen.	O Will depend upon redevelopment that occurs.	+ No major impacts foreseen.
Social Environment				
- Land Use	+ Mainly insensitive industrial and transportation uses.	+ Compatible with present and proposed uses.	+ Compatible with future proposed uses.	+ Relatively insensitive land uses.
- Transportation	? TBE Tasks 113, 118, 121, 122, 126.	? TBE Tasks 113, 118, 121, 122, 126.	? TBE Tasks 113, 118, 121, 122, 126.	? TBE Tasks 113, 118, 121, 122, 126.
- Noise and Aesthetics (2)	+ Generally compatible with existing characteristics.	+ Alignment is underground.	- Visual barrier in sensitive development area.	+ No significant impacts foreseen.
Cultural Heritage Environment	+ No impacts foreseen.	+ Archaeological remains may be present.	+ No impacts foreseen.	+ No impacts foreseen.
Economic Environment	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.

NOTES: (1) Ratings based on relative, overall advantages (+), disadvantages (-), or neutrality (O) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts To Be Evaluated (TBE) following completion of indicated task reports.

(2) Noise evaluation assumes operation of "stretched" ICTS vehicles.

TABLE I.4-4 Environmental Impact Evaluation of Western Section Options

Impact Category	Jefferson Option	Dufferin Option	Rail-Queen West to Bloor
Natural Environment	+ No major impacts foreseen. Jefferson and King area may be sensitive to shadows.	O Shadow impacts will depend upon portal location.	+ No major impacts foreseen.
Social Environment - Land Use	O Predominantly industrial/commercial.	- Portal at Temple Ave. may cause displacement of some residences.	+ Terminal station adjacent to district commerce centre.
- Transportation	? TBE Tasks 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.
- Noise and Aesthetics (2)	+ Compatible.	+ Generally compatible.	+ Compatible with rail corridor activity.
Cultural Heritage Environment	+ No known features in area.	+ No features will be impacted.	+ No known features in area.
Economic Environment	? TBE Tasks 119, 125.	? TBE Tasks, 119, 125.	? TBE Tasks 119, 125.

NOTES: (1) Rating based on relative, overall advantages (+), disadvantages (-), or neutrality (0) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts To Be Evaluated (TBE) following completion of indicated task reports.

(2) Noise evaluation assumes operation of "stretched" ICTS vehicles.

TABLE I.4-4 Environmental Impact Evaluation of Western Section Options (Cont'd)

Impact Category	Rail-Atlantic to Roncesvalles	Roncesvalles Option	Parkside Option
Natural Environment	+ Shadow impacts will depend upon relative elevation of guideway.	+ Shadow impacts will depend upon portal location.	- Loss of trees and natural park buffer zone.
Social Environment - Land Use	+ Adjacent to major transportation corridor.	+ Compatible with existing mixed commercial-residental development.	- Not compatible with low density residential and open space uses.
- Transportation	? TBE Tasks 113, 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.	? TBE Tasks 118, 121, 122, 126.
- Noise and Aesthetics (2)	+ Beaty Parkette may be sensitive to adverse impacts.	+ Alignment is underground.	- Adverse aesthetic impact on views of park.
Cultural Heritage Environment	+ No major impacts foreseen.	+ No major impacts foreseen.	+ No major impacts foreseen.
Economic Environment	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.

NOTES: (1) Rating based on relative, overall advantages (+), disadvantages (-), or neutrality (0) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts To Be Evaluated (TBE) following completion of indicated task reports.

(2) Noise evaluation assumes operation of "stretched" ICTS vehicles.

TABLE I.4-5 Environmental Impact Evaluation of Rail Yard Alternatives

Impact Category	Greenwood Yard	Eastern Ave. Yard
Natural Environment	+ No major impacts foreseen.	+ Levels of soil contamination at site unknown.
Social Environment - Land Use	+ Site used as rail yard since 1966.	O Generally compatible. Loss of industrial land.
- Transportation	? TBE Tasks 121, 122, 126.	? TBE Tasks 121, 122, 126.
- Noise and Aesthetics (2)	+ Compatible with existing environment.	+ Will depend on mitigation along northern edge adjacent to residences.
Cultural Heritage Environment	+ No known features in area.	+ No known features in area.
Economic Environment	? TBE Tasks 119, 125.	? TBE Tasks 119, 125.

NOTES: (1) Rating based on relative, overall advantages (+), disadvantages (-), or neutrality (O) of options with respect to potential impacts, excluding general construction impacts. "?" signifies impacts To Be Evaluated (TBE) following completion of indicated task reports.

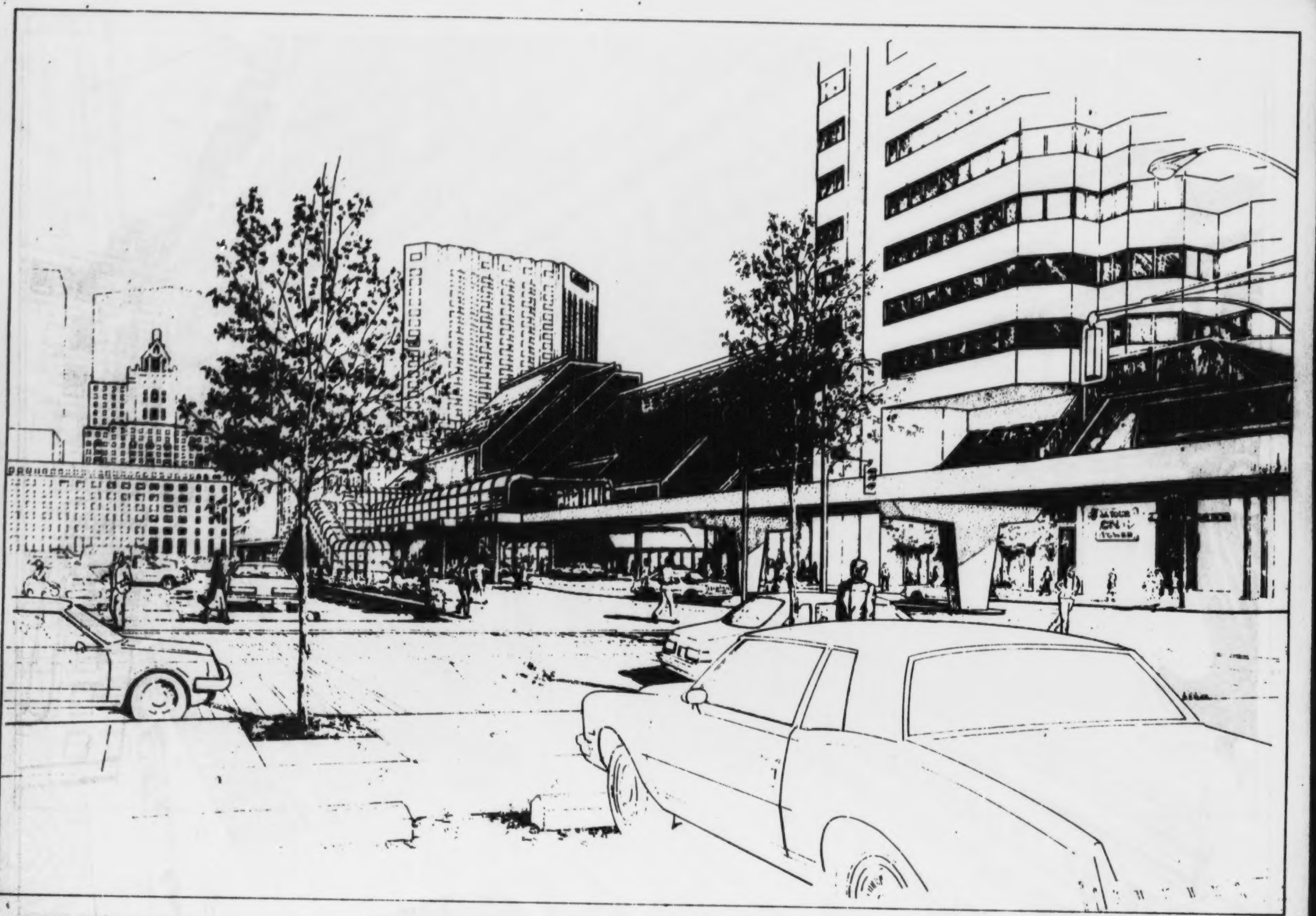
(2) Noise evaluation assumes operation of "stretched" ICTS vehicles.

APPENDIX [illegible]

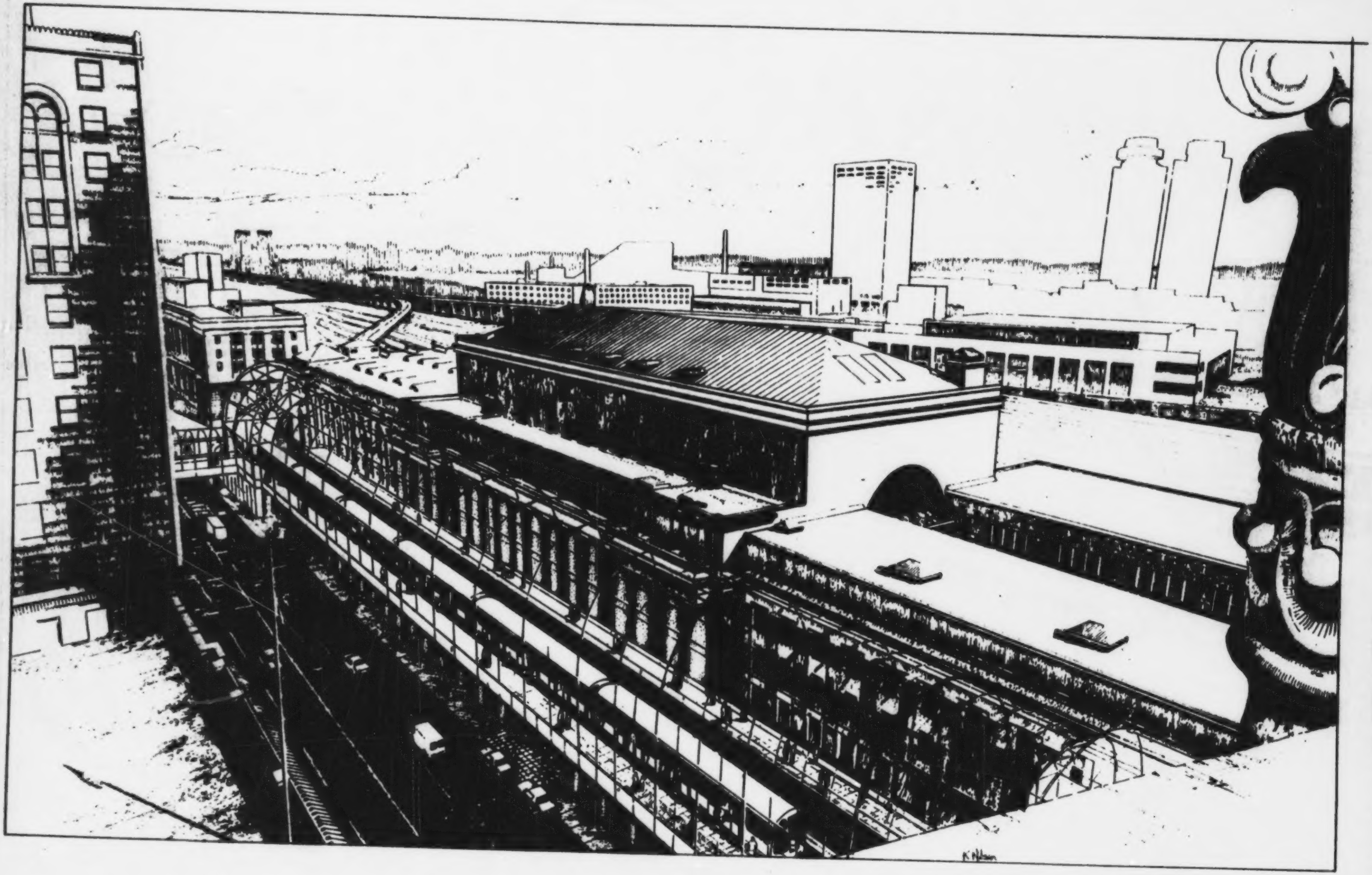
Perspective Drawings of Elevated Stations on Fixed Route

- Union Station
- Convention Center

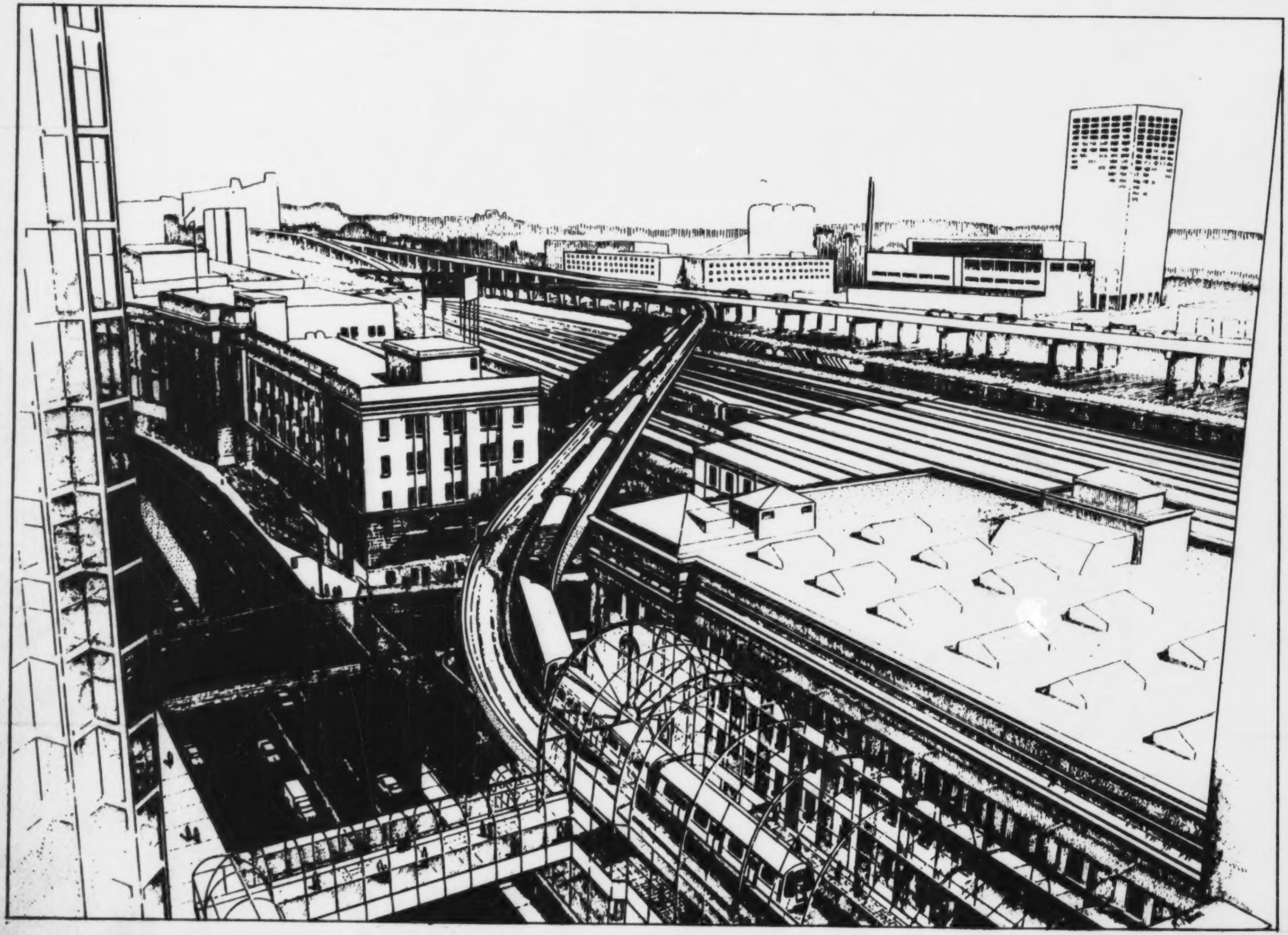
Schematic Showing Existing and Possible Future Pedestrian Connections in Vicinity of Union Station


LA TOUR CN TOWER

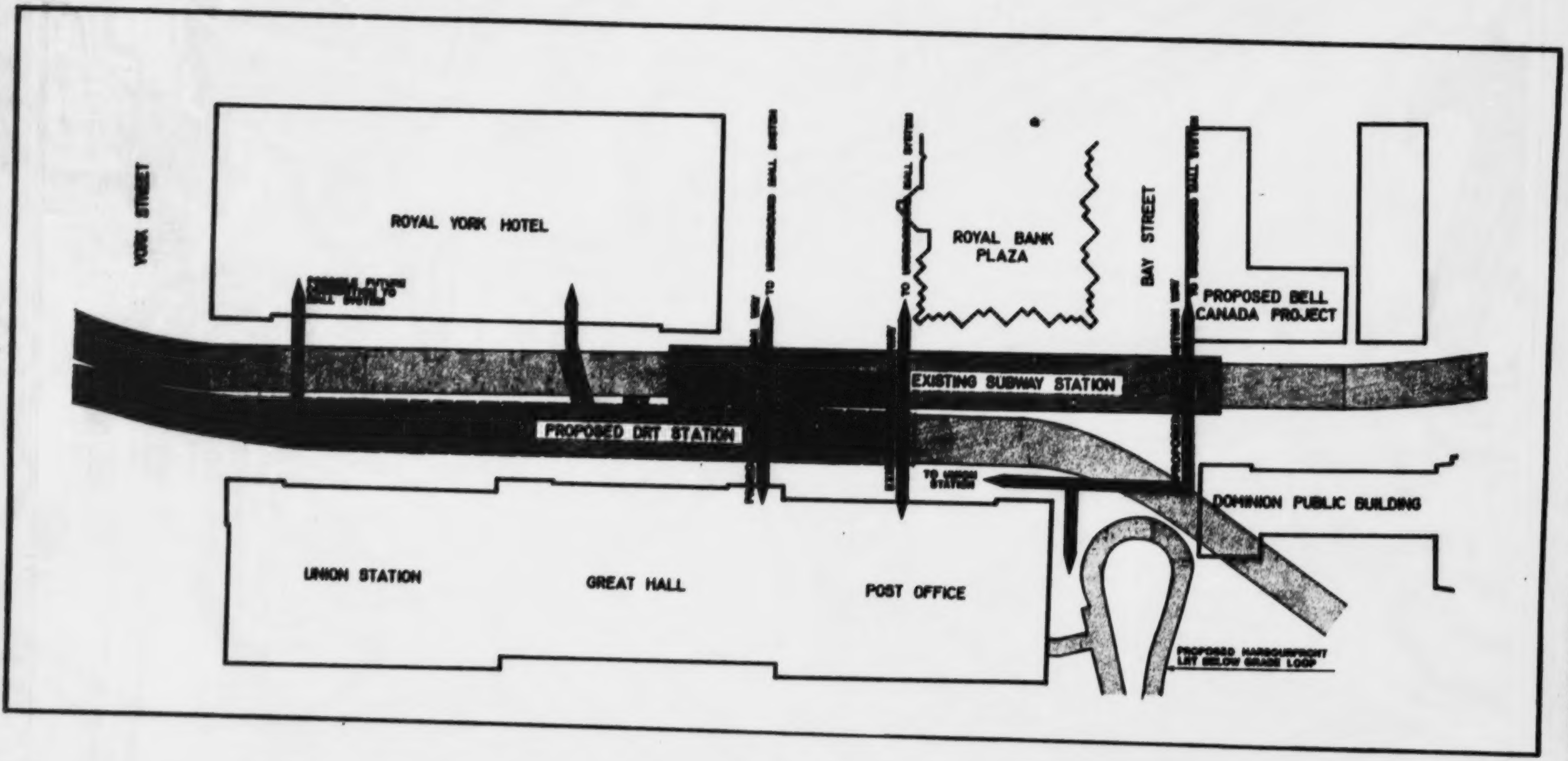
CONVENTION CENTRE



UNION STATION



UNION STATION (LOOKING EAST)


YORK STREET
ROYAL YORK HOTEL
POSSIBLE FUTURE CONNECTION TO MALL SYSTEM
TO UNDERGROUND MALL SYSTEM
TO UNDERGROUND MALL SYSTEM
ROYAL BANK PLAZA
BAY STREET
TO UNDERGROUND MALL SYSTEM
PROPOSED PEDESTRIAN WAY
PROPOSED BELL CANADA PROJECT
EXISTING SUBWAY STATION
PROPOSED DRT STATION
TO UNION STATION
DOMINION PUBLIC BUILDING
UNION STATION
GREAT HALL
POST OFFICE
PROPOSED HARBOURFRONT LRT BELOW GRADE LOOP

EXISTING AND POSSIBLE FUTURE
UNDERGROUND PEDISTRIAN CONNECTIONS
IN VICINITY OF UNION STATION

EXHIBIT D-1
CAPITAL COST SUMMARY[1,2]
(1984 - $ Million)

CENTRAL SECTION OPTIONS (Spadina Ave.to Don River)	TION OPTIONS Don River to Danforth		
	Don Valley-Broadview	**Pape-Eastern**	**Donlands-Railway**
Queen (Underground)	$ 544 M	Not Applicable	$ 582 M
King Via Queen (Underground)	$ 544 M	Not Applicable	$ 582 M
King Via Front (Underground)	$ 549 M	$ 541 M	$ 559 M
Wellington/Front (Underground)	$ 554 M	$ 546 M	$ 565 M
Front/Railway (Underground)	$ 556 M	$ 538 M	$ 556 M
Front/Railway (Elevated)	$ 504 M	$ 486 M	$ 504 M
Railway Lands (Elevated)	$ 477 M	$ 459 M	$ 477 M
Bay LRT Bloor to Union (Underground)		$ 266 M	

NOTES:

1. Capital costs include line, recommended stations, yard construction, vehicle, and property costs. Yard construction and vehicle costs listed below have been included in the above Capital Cost Summary:

Yard Costs		
Don Valley - Brickyard	$ 76M	($50M for yard itself plus $26M for spur line to yard)
Pape-Eastern	$ 40M	
Greenwood/Kipling	$ 65M	

Vehicle Cost		
Don Valley	$100M	(50 vehicles)
Pape-Eastern	$108M	(54 vehicles)
Donlands-Railway	$116M	(58 vehicles)
Bay LRT	$ 36M	(22 vehicles)

2. Net additional cost for optional stations at Gerrard and at Sherbourne are:
   Gerrard - Add $19M via Pape or Don Valley; $11M via Donlands-Railway
   Sherbourne - Add $19M via Queen, King or Wellington; $11M via Railway
   These optional station costs have not been included in the above Capital Cost Summary.

EXHIBIT D-2
OPERATING COST SUMMARY

	DRT OPTIONS				BAY LRT	
	Pape-Eastern			Donlands-Railway		
	Railway-Front	Front-Wellington	Front-King	Queen-King	Bloor to Union	
Round Trip Distance (Km)	15.61	15.50	15.50	16.64		6.24
Round Trip Time (Mins) Peak	24.65	24.47	24.47	26.27		20.0
Off-Peak	24.02	23.85	23.85	25.60		19.0
Headway (Mins) Peak	2.04	2.04	2.04	2.04		2.00
Off-Peak	4.10	4.10	4.10	4.10		4.00
Vehicles Scheduled	48	48	48	52		20
Total (Including Spares)	54	54	54	58		22
Net Annual Operating Costs of DRT (Bay LRT) 1984 $Millions[1]						
4 car Trains[1,2]	$ 10.1	$ 10.1	$ 7.0	$ 8.5	Two men per train -Pay on board[1,3]	$ 2.0 M
6 Car Trains[1,2]	$ 9.6	$ 9.6	$ 6.5	$ 8.1	One man per train plus station collectors[1,3]	$ 2.5 M
Peak/Off-Peak Capacity Reduced to 15,000/3,100[1]	$ 6.7	$ 6.7	$ 3.6	$ 6.3		

NOTES:

1. Net Annual Operating Costs include operating cost savings resulting from service adjustments on connecting and parallel surface routes. These savings are as follows: Front-Railway and Wellington-Front-Eastern-Pape - $2.5M; King-Front-Eastern-Pape -$5.6M; King-Queen-Railway-Donlands - $4.4M; Bay LRT - $3.3M.

2. Assumes DRT peak/off-peak capacity of 20,000/4,100, 2 operators per train (peak), 1 per train (off-peak), average peak/off-peak speeds of 38 and 39 km/hr, vehicle capacity = 170 per car (peak), 70 per car (off peak), 4 or 6 car 'stretched' ICTS trains.

3. Assumes peak/off-peak capacity of 8,100/2,340, average peak/off-peak speed of 18.7 and 19.7 km/hr, vehicle capacity = 135 (peak), 78 (off-peak), 2 car ALRV trains.

SOURCE OF ESTIMATES

Construction costs contained in Appendix D were prepared by the Engineering and Construction Branch of the Toronto Transit Commission. Vehicle and operating costs were prepared from operational analysis studies undertaken by the Planning Branch of the Toronto Transit Commission. Property costs were prepared by the Property and Parks Department of Metropolitan Toronto.

BASE YEAR

All capital costs are in 1984 dollars and are based on either local 1984 construction costs or the most recent tenders for similar products and services.

WORK INCLUDED

Work included in the construction cost estimates contained in Appendix D is based on project plans by the Engineering and Construction Branch of the Toronto Transit Commission and include the following items:

- Civil Works
- New and Reconstructed Utilities
- Station and Structures
- Power and Communication
- Signalling and Train Control
- Trackwork
- Engineering
- Project Management.

APPENDIX E

Demand Analysis

Prepared by Metro Planning Department

January 3, 1985

DOWNTOWN RAPID TRANSIT STUDY

SUMMARY OF PHASE II DEMAND ANALYSIS

1. Background

The Metropolitan Planning Department undertook a number of Phase I travel demand analyses for the Downtown Rapid Transit Study, as well as other rapid transit studies, using the computerized Metro Travel Demand Model. These analyses included a year 2001 Base Case option, in which no additional rapid transit facilities were assumed in Metro although certain improvements were assumed to surface transit and road facilities, and a 2001 Lower "U" option, in which a new rapid transit line was assumed from Dundas West to Donlands subway station via Union station along the railway alignment. For each of these runs, the area modelled was the Toronto Census Metropolitan Area, which was divided into 297 traffic zones, 186 of which were in Metro. The purpose of the Phase I analyses was to determine approximate potential demands and capacity surpluses or deficiencies in various parts of the study area, in relation to different future rapid transit options. All the runs used a common set of land use (population and employment) projections based on GO-ALRT Scenario "A". Within Metro, the GO-ALRT projections by Planning District were disaggregated to traffic zones by Research Division staff.

2. Phase II Procedures

The objective of Phase II was to undertake more detailed corridor analyses of specific rapid transit alignments. The Phase II D.R.T. analysis assumed a rapid transit "downtown relief" line from Pape station on the Bloor-Danforth Subway, south along Pape Avenue, west along the rail line to Eastern Avenue, then west along Front Street terminating at Spadina Avenue. Intermediate stations were assumed at Pape and Gerrard, Queen and Broadview, Sherbourne Street and Union Station.

For this purpose, the Phase I zone system in parts of Planning Districts 1 and 6 (shown in Exhibit 1) was disaggregated as shown in Exhibit 2. A new zone was defined around each of the six stations to represent a walk-in catchment area within 500 m. These zones are shown shaded in Exhibit 2. Since they were defined on a block basis, they are somewhat irregular in shape. Two additional zones (199 and 200) were defined to represent residual areas of the original traffic zones. The operating speed of the line was assumed to be 40 km/h, compared to 30 km/h in Phase I. This was considered to be consistent with the average station spacing of 1.5 km; sections of the subway with similar station spacing operate at a similar speed. Staff of the City of Toronto Planning and Development Department assisted in the preparation of population and employment projections for the revised zone system in P.D.'s 1 and 6. While City staff were in agreement with the total Phase I population and employment projections for P.D.1, on the basis of detailed analysis of proposed and projected office developments they redistributed the employment by traffic zone within P.D.1 for Phase II. Essentially, more employment was allocated to zones along the Yonge Street axis and along the Waterfront/Railway Lands, and less to the areas to the east and west. Exhibit 3 compares the Phase II year 2001 employment allocation to Phase I and to existing (1983) surveyed employment within P.D.1. The zone system population and employment in the remainder of the Toronto C.M.A. were left the same as in Phase I.

The Phase I Base Case transit network was modified to include the new rapid transit line and stations, and the centroid connectors were modified to accommodate the revised zone system. Minor modifications were made to the surface transit network, for example the frequency of services on the King and Queen routes were assumed to be reduced. The Phase I road network was also modified to include the added zones.

After checking sample minimum time paths, the Metro Travel Demand Model was applied, following the steps of trip generation, distribution and modal split for 24 hour home-to-work trips, which were then factored to represent a.m. peak hour total trips. Finally, the a.m. peak hour auto, transit and GO Rail trips were assigned to the appropriate networks on an all-or-nothing minimum time path basis.

3. Analysis of Results

Exhibit 4 summarizes the results of the transit trip assignment. It shows the a.m. peak hour year 2001 simulated demand on each link of the downtown relief line for the peak (westbound) direction. It also shows demand for selected links on the westbound Bloor-Danforth Subway and southbound Yonge-University Subway. The numbers in parentheses are a manual estimate of the subway demand for year 2001 if the relief line were not in place. These numbers are different from the demands simulated in the Phase I Base Case option, primarily because of the difference in the employment allocation in P.D.1. Because they are manually estimated, they are less reliable than those produced by the model.

Without the relief line, it is estimated that the demand on Yonge would exceed the subway operating capacity of approximately 34,000 passengers per hour. In addition, transfer movements at Bloor/Yonge would increase. With the line, the numbers indicate that approximately 7,500 to 8,000 peak hour trips could be diverted from the westbound Bloor-Danforth line between Yonge and Pape, and from the Yonge line south of Bloor. It appears that the demand on the University line would not be significantly affected; while some trips from the east to the western waterfront area would be diverted to the relief line, other trips from the west to the eastern waterfront would be attracted to the southbound University and eastbound relief line.

The demand assigned to the relief line is considerably higher than that assigned to the Lower "U" line in Phase I. There are four main reasons for this:

(1) Reallocation of employment in P.D.1 to make more employment accessible to the subway and/or relief line;

(2) Creation of zones representing walk-in catchment areas;

(3) The higher speed assumed on the relief line (40 km/h vs 30 km/h);

(4) Connection of the line to Pape rather than Donlands station enables more trips to be intercepted from the bus lines on Pape Avenue.

As with any such demand modelling exercise, demand is intimately tied to the population and employment projections. If the development changes projected did not in fact take place by the assumed horizon year, the demand projections would be affected accordingly.

Further detailed analysis was undertaken to identify the riders assigned to the relief line. Exhibit 5 shows the access mode of trips boarding the relief line at the Pape/Danforth station. As shown, 70% of the 12,200 riders are transfers from the westbound subway and 10 percent. transfer from the eastbound subway. The latter are destined mainly to zones served by the Gerrard station on the relief line. Fifteen percent. of the riders are simulated as arriving by bus, and five percent. are from the direct walk-in catchment zone.

The same trips are broken down according to their zone of destination in Exhibit 6. The largest proportion (37 percent.) are destined to Zone 14, bounded by Queen, Yonge, Wellington and Simcoe Streets, which has the largest employment of any zone in P.D.1. A total of 31 percent. are destined to the three Waterfront/Railway Lands zones directly served by the relief line. With the exception of trips destined to P.D.6 (east of the Don River), virtually all of the trips boarding the line at Pape are destined to zones south of Queen Street. If the line were located further north, e.g. along King Street, it would probably attract more trips with destination north of Queen Street, but fewer to the Waterfront zones which would be less directly served.

Exhibit 7 analyzes the trips on the peak westbound link between Sherbourne and Union, by station and mode of access to the relief line. Approximately 9,100 trips are assigned through from Pape station to Union or beyond; this represents 58 percent. of the 15,700 trips on the peak link, and 75 percent. of the 12,200 trips boarding at Pape. About 18 percent. of the peak link assignment, or 2,800 trips, transfer to the westbound relief line from east/west surface transit routes at the Queen-Broadview station. This represents a significant diversion from the Queen and King routes.

Exhibit 8 shows the station to station flows on the relief line, while Exhibit 9 summarizes the ons and offs at each station by access and egress mode.

At Union Station, if the line were further south along the north edge of the railway alignment, necessitating a longer walk (approximately 2 minutes) between the relief line and Union subway station, sensitivity tests indicate that up to 1,000 fewer peak hour trips would be assigned to the relief line, with a corresponding increase in the Yonge line. A line on the proposed Esplanade West alignment, south of the railway corridor, would be expected to attract still fewer trips.

The number of transfer movements between the relief line, the subway and GO Rail at Union Station is a concern, and is critical in the design of transfer and pedestrian facilities in this congested area. Exhibit 10 summarizes the various movements through Union Station as simulated by the model for 2001 a.m. peak hour. Approximately 44,000 peak hour passenger movements are simulated through the combined subway/relief line/GO Rail station area. This does not include any walk trips between zones north and south of Wellington Street, nor any additional transfer movements that might be generated by a Harbourfront L.R.T., which was not simulated in the model. For example, some trips from the east to Zone 195 (western waterfront), which the model simulates as continuing on the relief line to Spadina, would probably transfer at Union to the

Harbourfront L.R.T. if it was in place. Also, it is thought that the GO Rail trips could be under-simulated. A need for significant additional pedestrian walkways and circulation facilities is indicated.

4. Conclusions

According to the year 2001 a.m. peak hour travel demand simulation:

- The peak point ridership of 15,700 passengers per hour on the proposed downtown relief line is significantly higher than in the Phase I simulation.

- Approximately 8,000 a.m. peak hour passengers would be diverted from the westbound Bloor-Danforth line between Pape and Yonge and from the southbound Yonge line below Bloor, relative to the demand without a relief line. Without the relief line, demand would reach or exceed present subway operating capacity at peak points on the Bloor-Danforth and Yonge-Spadina lines.

- Demand on the University leg would not change significantly with the introduction of a relief line (unless it were extended north-westerly to meet the Bloor line).

- A Front Street alignment would attract more trips to the relief line than either a railway or Esplanade West alignment, as it would provide better access to Union subway station and to the employment concentration north of Front Street.

- The volume of transfer movements between the subway, the relief line, GO Rail and the surrounding walk-in catchment areas at Union Station would require significant additional pedestrian facilities.

- The relief line demand if the alignment were on King Street rather than Front Street has not been estimated. Some trips to the Waterfront/Railway lands area would be lost, while additional trips to employment areas north of King and Queen Streets would be attracted. The volume of transfer movements at Union Station would probably be less.

MS/eb

EXHIBIT 1

PHASE 1 ZONE SYSTEM IN P.D. 1 & P.D. 6 (WESTERN PORTION)

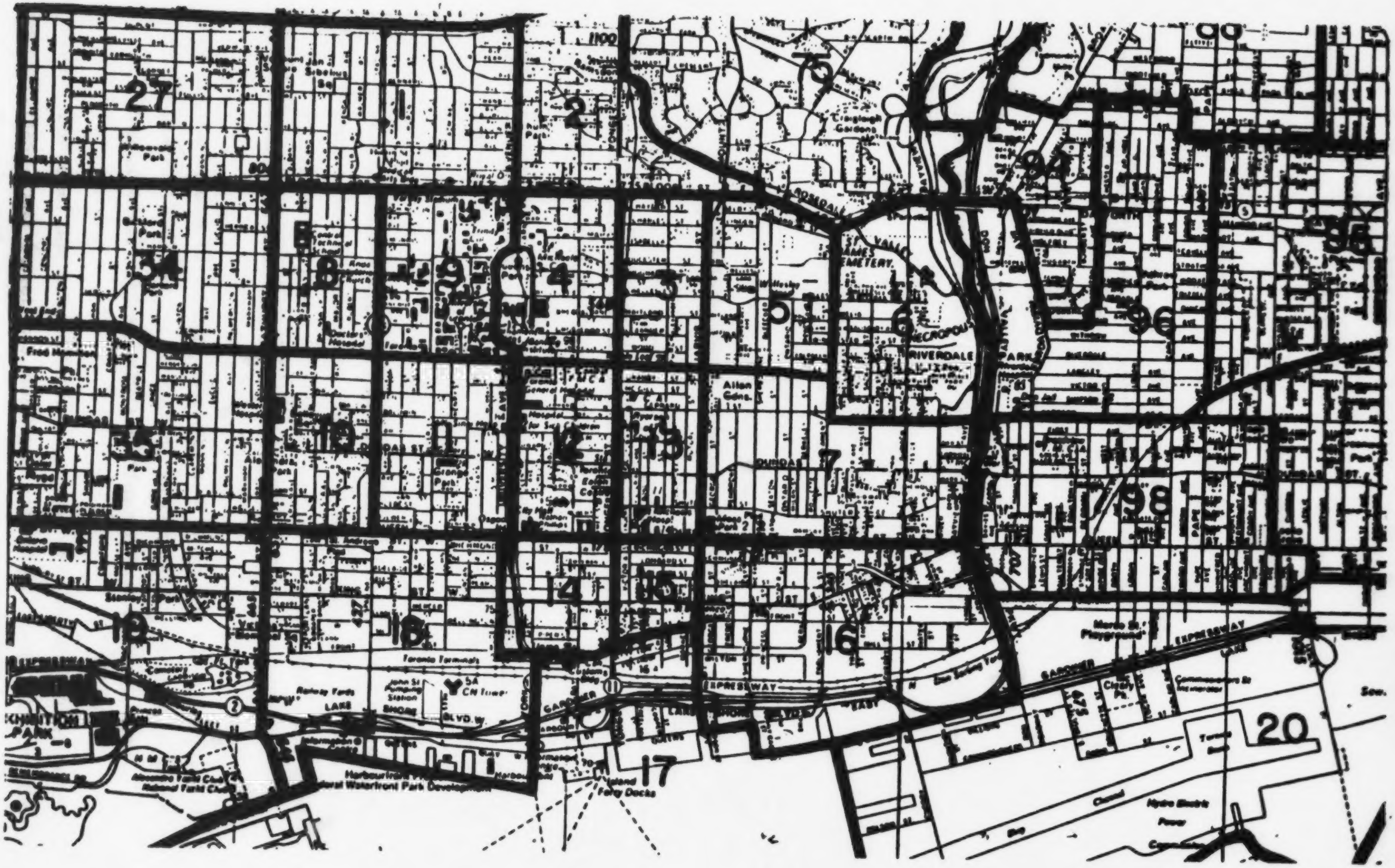
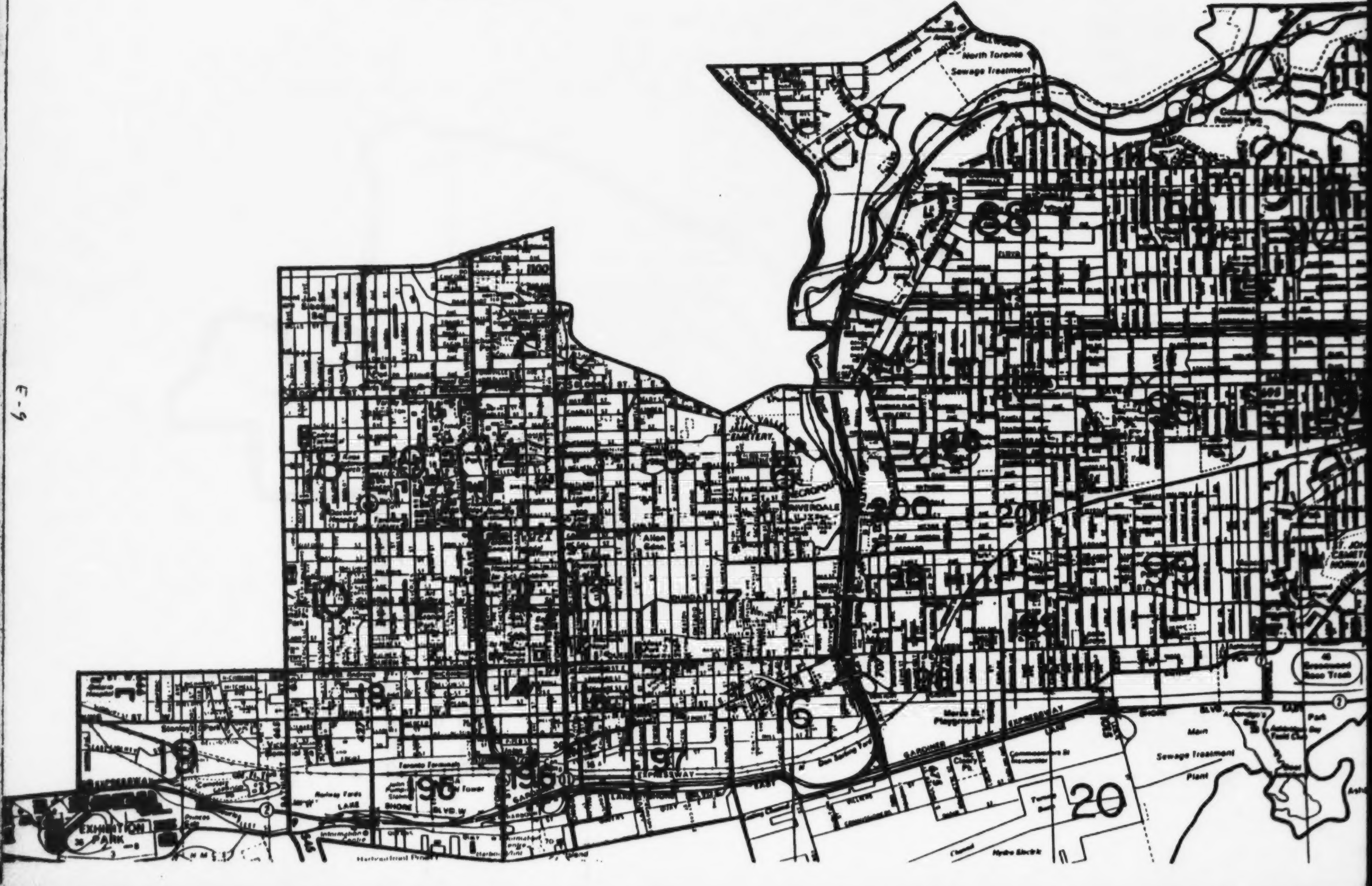

27
1
2
75
94
99
95
34
8
9
4
3
5
6
96
35
10
11
12
13
7
798
14
15
16
18
19
17
20
RIVERDALE
NECROPOLIS
EXPRESSWAY
GARDNER
LAKE SHORE BLVD. W.
Toronto Terminals
CN Tower
Allan Gdns.
Island Ferry Docks
Harbourfront Park Development
EXHIBITION PARK

EXHIBIT 2

PHASE 2 D.R.T. ZONE SYSTEM IN P.D. 1 & P.D. 6

(WESTERN PORTION)


North Toronto
Sewage Treatment
88
200
201
18
19
16
196
195
197
20
Main
Sewage Treatment
Plant
GARDINER
EXPRESSWAY
EXHIBITION PARK

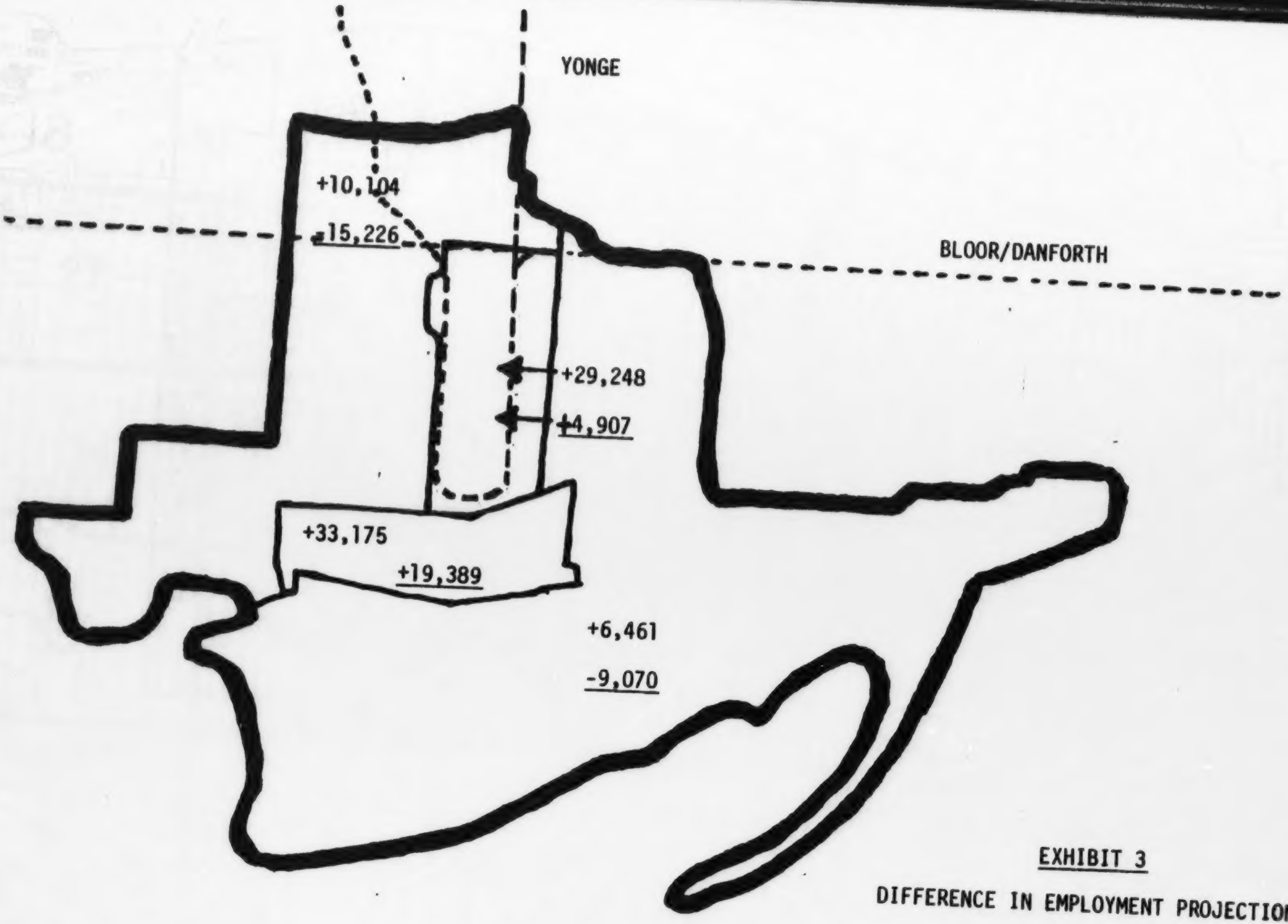

YONGE
BLOOR/DANFORTH
+10,104
-15,226
+29,248
+4,907
+33,175
+19,389
+6,461
-9,070

EXHIBIT 3

DIFFERENCE IN EMPLOYMENT PROJECTIONS

2001 PHASE 2 VS 1983

2001 PHASE 2 VS 2001 PHASE 1

EXHIBIT 4

DOWNTOWN RAPID TRANSIT STUDY

SUMMARY OF 2001 A.M. PEAK HOUR RAPID TRANSIT SIMULATED DEMAND

(ANNUAL AVERAGE)

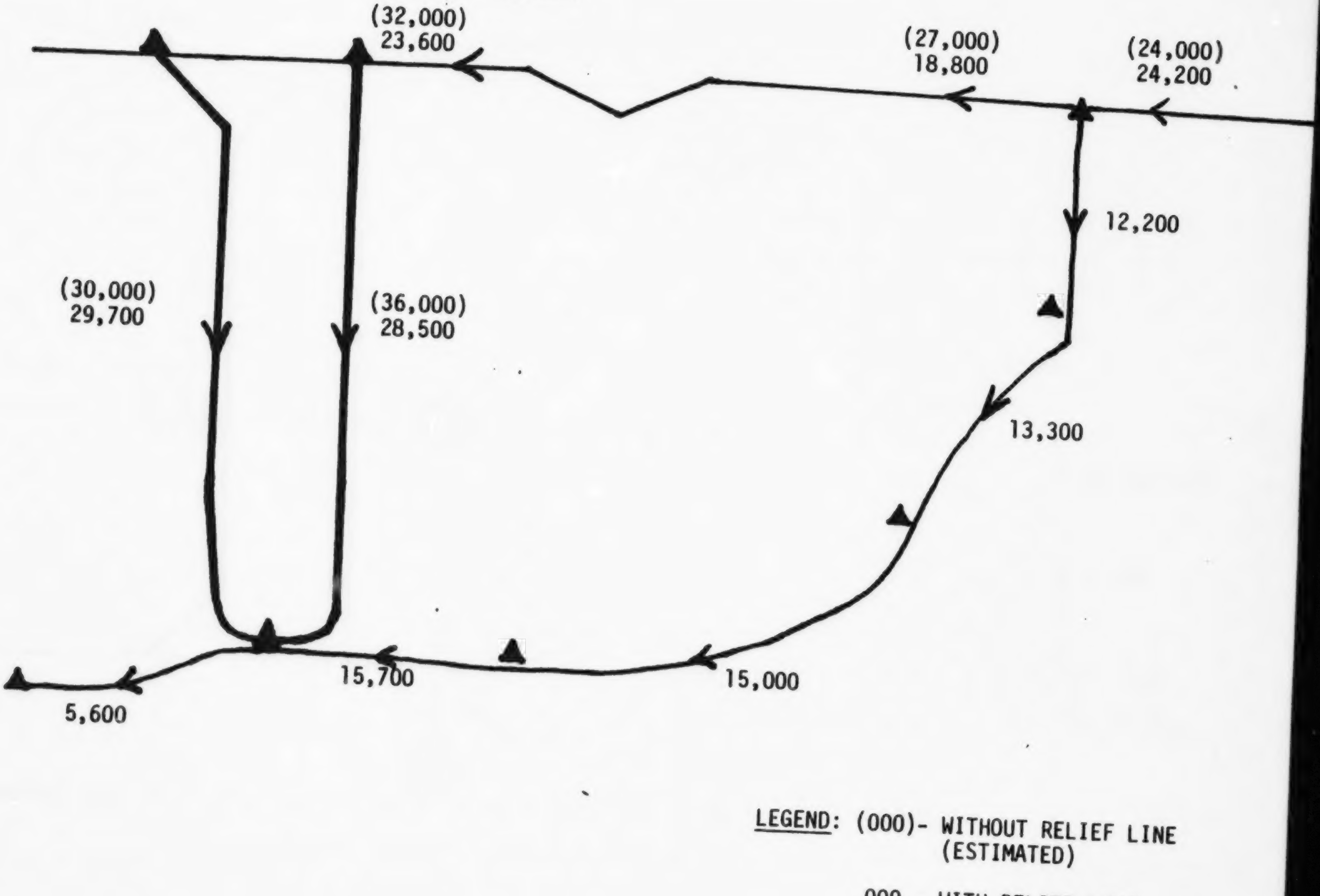
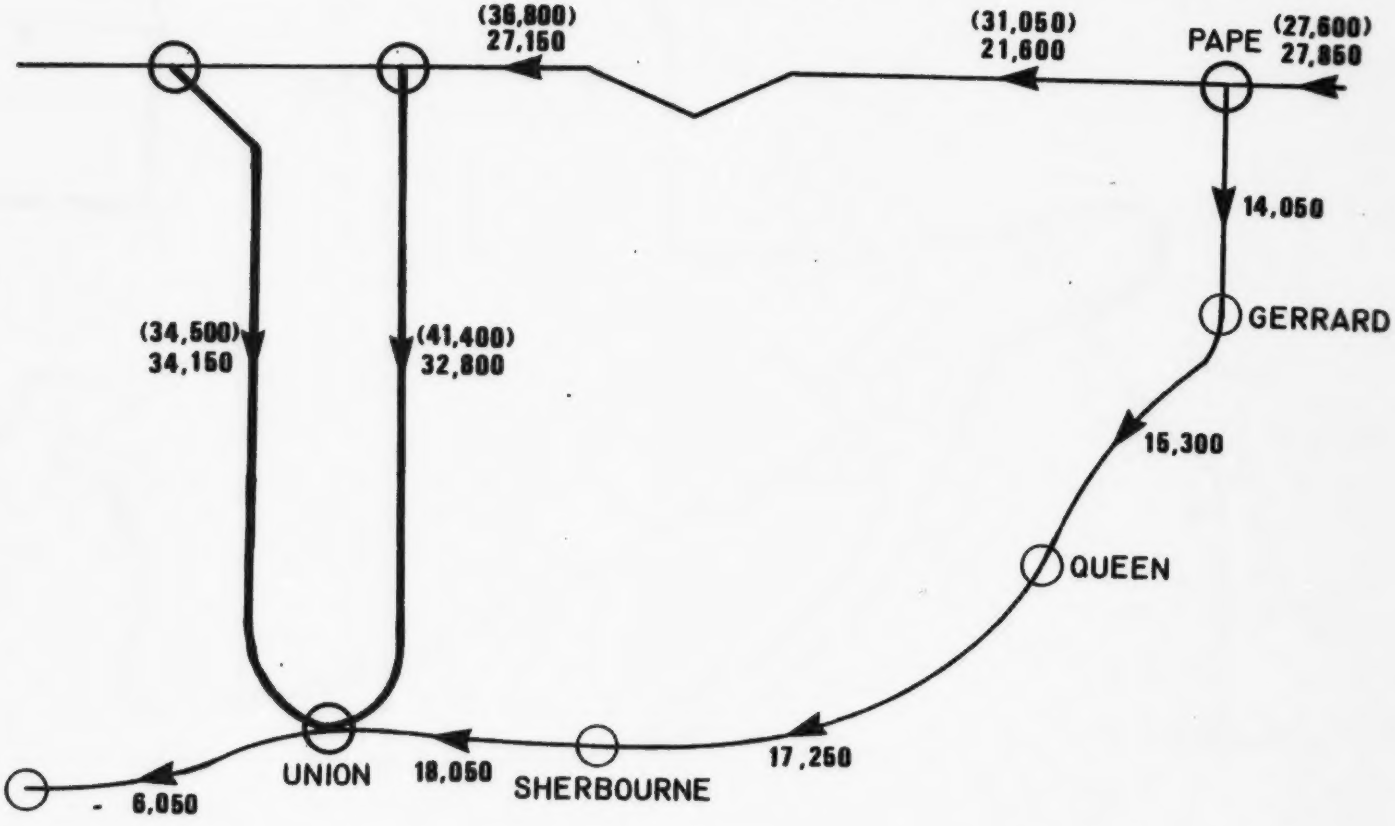

(32,000)
23,600
(27,000)
18,800
(24,000)
24,200
12,200
(30,000)
29,700
(36,000)
28,500
13,300
15,700
15,000
5,600
LEGEND: (000)- WITHOUT RELIEF LINE (ESTIMATED)
000 - WITH RELIEF LINE

EXHIBIT 4A
DOWNTOWN RAPID TRANSIT STUDY
SUMMARY OF 2001 A.M. PEAK HOUR RAPID TRANSIT SIMULATED DEMAND[1]


PAPE
(27,600)
27,850
(31,050)
21,600
(36,800)
27,150
14,050
GERRARD
15,300
QUEEN
(34,500)
34,150
(41,400)
32,800
17,250
SHERBOURNE
18,050
UNION
- 6,050

(000) - WITHOUT RELIEF LINE ESTIMATED

000 - WITH RELIEF LINE

1. FORECAST AVERAGE ANNUAL RIDERSHIP INCREASED BY 15% TO REFLECT PEAK SEASON RIDERSHIP

EXHIBIT 5

DOWNTOWN RAPID TRANSIT STUDY
DISTRIBUTION BY ACCESS MODE OF TRIPS BOARDING RELIEF LINE AT PAPE/DANFORTH STATION

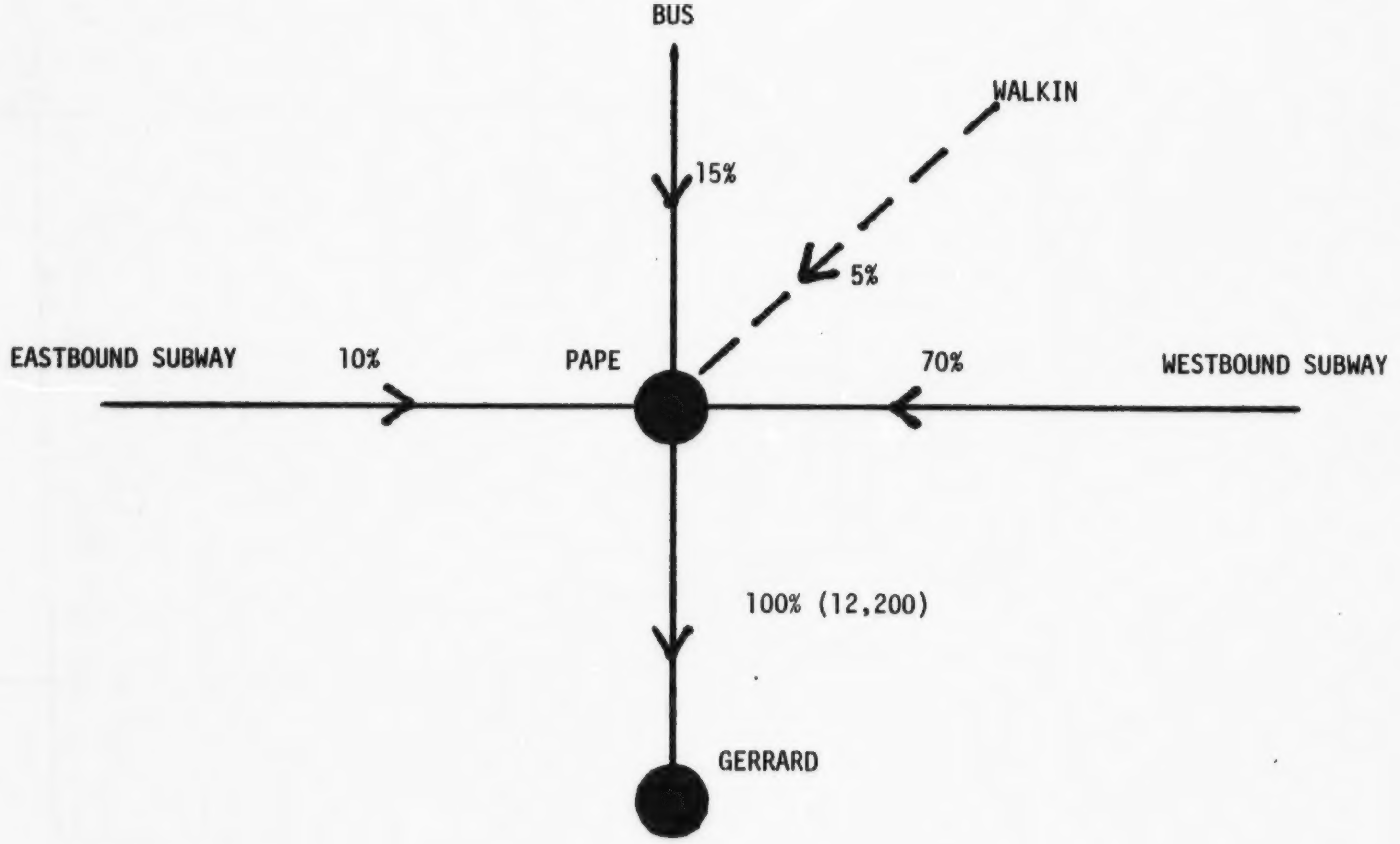

BUS
15%
WALKIN
5%
EASTBOUND SUBWAY
10%
PAPE
70%
WESTBOUND SUBWAY
100% (12,200)
GERRARD

EXHIBIT 6
DISTRIBUTION BY DESTINATION OF TRIPS
BOARDING RELIEF LINE AT PAPE/DANFORTH STATION

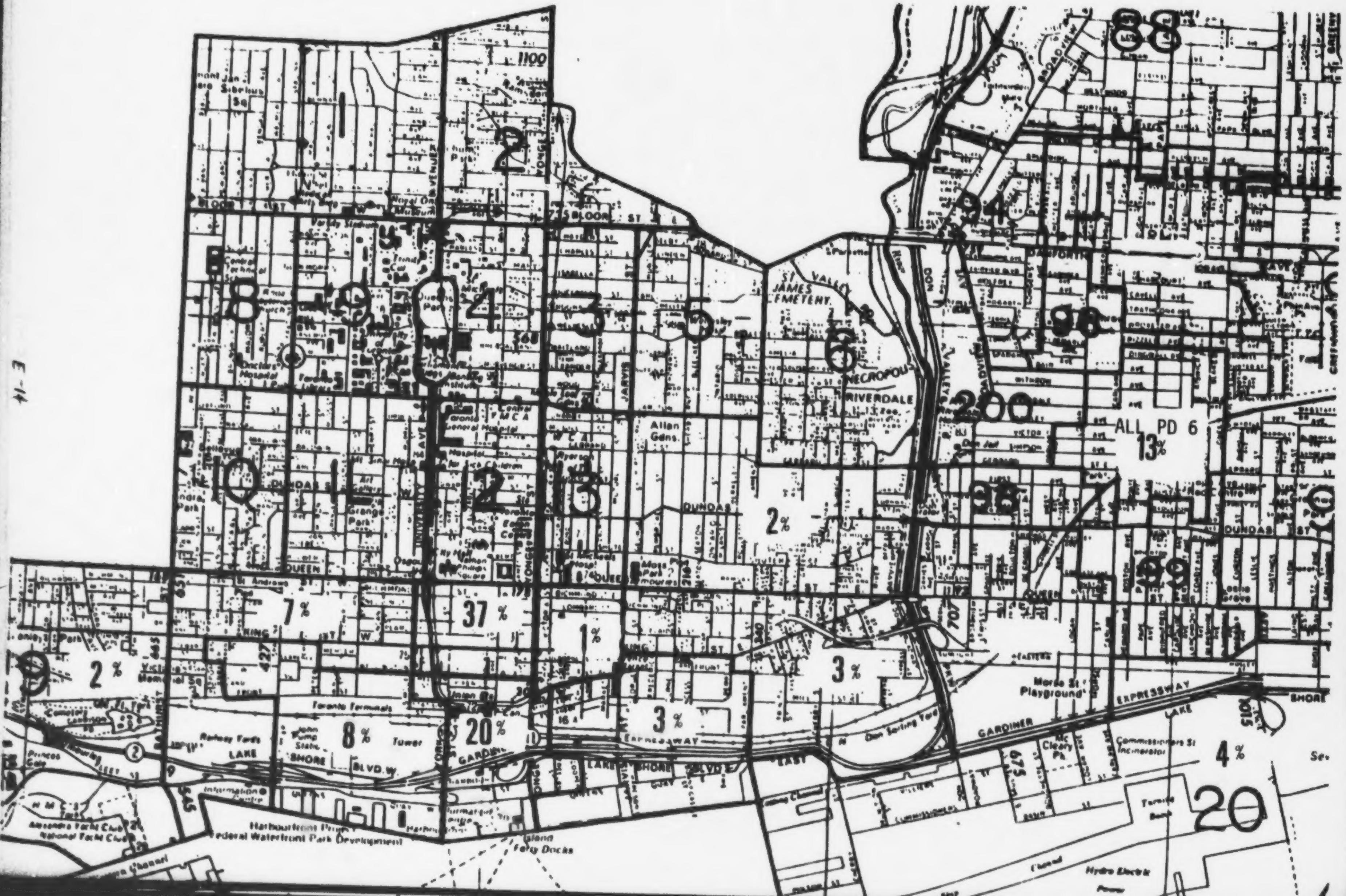

88
1
2
94
8
4
3
5
6
98
200
ALL PD 6
13%
10
11
12
13
96
97
2%
99
7%
37%
1%
3%
9
2%
3%
8%
20%
4%
20
BLOOR ST
DANFORTH
DUNDAS
QUEEN
KING
JARVIS
YONGE
UNIVERSITY AVE
DON VALLEY
ST JAMES CEMETERY
NECROPOLIS
RIVERDALE
Allan Gdns.
GARDINER EXPRESSWAY
LAKE SHORE BLVD. W
Toronto Terminals
Moss St Playground
Harbourfront Park
Federal Waterfront Park Development
Island Ferry Docks

EXHIBIT 7

DISTRIBUTION BY ACCESS AND EGRESS STATION AND MODE OF TRIPS

ON SHERBOURNE-UNION LINK

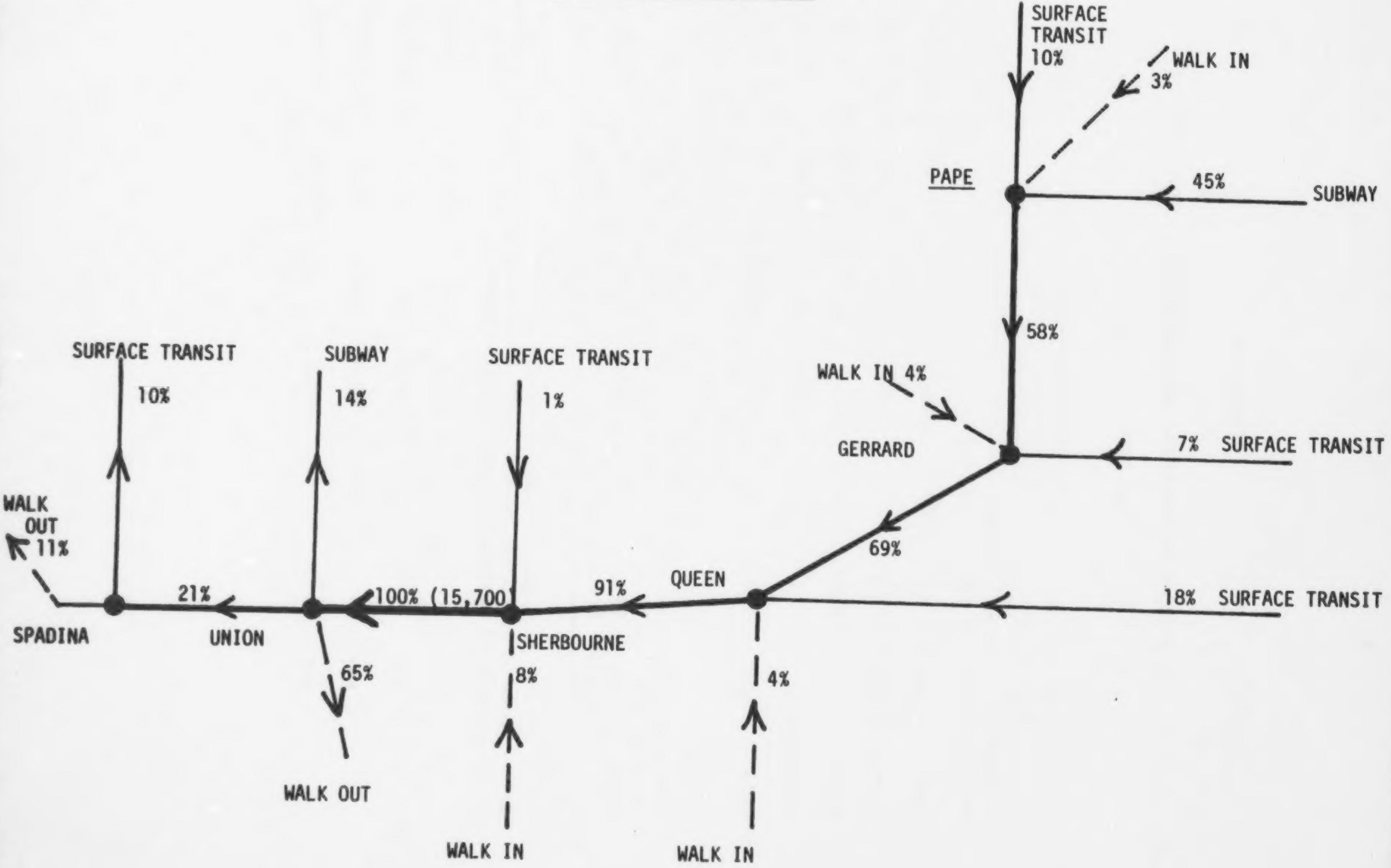

SURFACE TRANSIT 10%
WALK IN 3%
PAPE
45%
SUBWAY
58%
WALK IN 4%
GERRARD
7% SURFACE TRANSIT
69%
QUEEN
18% SURFACE TRANSIT
4%
WALK IN
91%
SHERBOURNE
8%
WALK IN
SURFACE TRANSIT
1%
100% (15,700)
SUBWAY
14%
UNION
65%
WALK OUT
SURFACE TRANSIT
10%
21%
SPADINA
WALK OUT 11%

EXHIBIT 8

STATION TO STATION FLOWS ON DOWNTOWN RELIEF LINE

(Year 2001, A.M. Peak Hour)

	TO						
FROM	Pape	Gerrard	Queen	Sherbourne	Union	Spadina	TOTAL
Pape	–	1,000	1,700	400	7,100	2,000	12,200
Gerrard	1,000	–	200	100	1,500	300	3,100
Queen	400	100	–	200	2,800	500	4,000
Sherbourne	–	–	100	–	1,000	400	1,500
Union	–	–	500	600	–	2,300	3,400
Spadina	100	–	100	100	1,400	–	1,700
TOTAL	1,500	1,100	2,600	1,400	13,800	5,500	25,900

NOTE: Some of the trips between Spadina and Union would take a Harboufront L.R.T. if implemented (not assumed in model).

EXHIBIT 9

SUMMARY OF STATION ONS AND OFFS FOR DOWNTOWN RELIEF LINE

Station	W.B. Ons	E.B. Ons	Total Ons	From Subway	From Surface	From Walk-in
Pape	12,200	–	12,200	80%	15%	5%
Gerrard	2,100	1,000	3,100	–	60%	40%
Queen	3,500	500	4,000	–	80%	20%
Sherbourne	1,400	100	1,500	–	10%	90%
Union	2,300	1,100	3,400	100%	–	–
Spadina	–	1,700	1,700	–	10%	90%

Station	W.B. Offs	E.B. Offs	Total Offs	To Subway	To Surface	To Walk-in
Pape	–	1,500	1,500	80%	15%	5%
Gerrard	1,000	100	1,100	–	55%	45%
Queen	1,900	700	2,600	–	45%	55%
Sherbourne	700	700	1,400	–	5%	95%
Union	12,400	1,400	13,800	20%	–	80%
Spadina	5,500	–	5,500	–	30%	70%

EXHIBIT 10

SUMMARY OF MOVEMENTS THROUGH UNION STATION

(Year 2001, A.M. Peak Hour)

	TO					
FROM	Relief Line	Subway	GO Rail	Zone 14	Zone 196	TOTAL
Relief Line	-	2,700	-	7,000	4,100	13,800
Subway	3,400	-	-	-	7,900	11,300
GO Rail	2,200	8,800	-	4,700	2,700	18,400
Zone 14	-	-	-	-	-	-
Zone 196	-	100	-	-	-	100
TOTAL	5,600	11,600	-	11,700	14,700	43,600

NOTES: Zones 14 (north of Wellington St.) and 196 (south of Wellington St.) are assumed within walking distance of Union Station.

Trips to parts of Zone 14 would probably transfer to the subway.

Transfers to/from Zone 196 would include trips on a Harbourfront L.R.T. (not assumed in model)

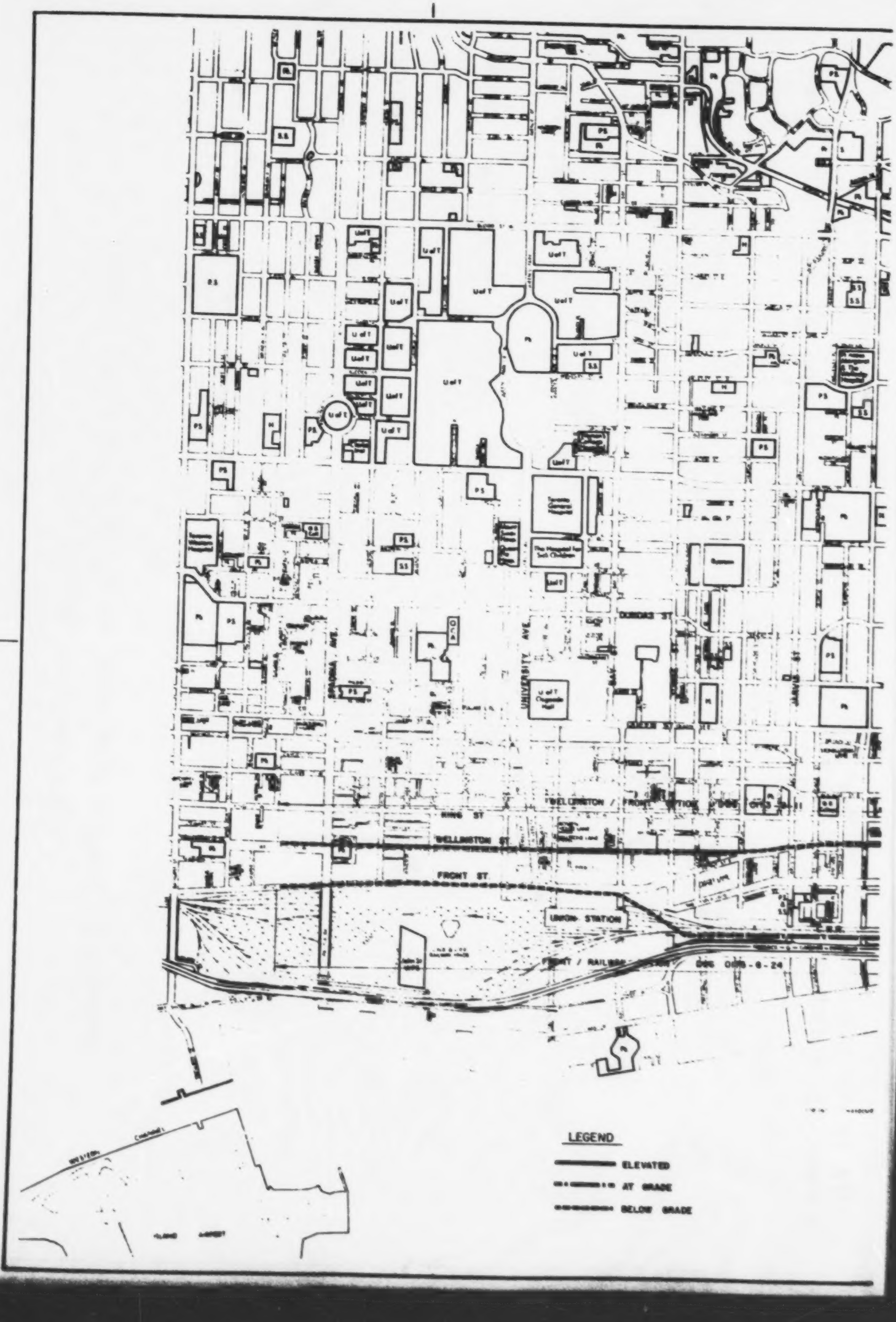
A Harbourfront L.R.T. would probably generate additional transfers of trips originating from or destined to Zones 195 and 197.

Trips from Zone 196 to Zone 14 are not included.

APPENDIX F

Detailed Plans of Recommended Options

A-1

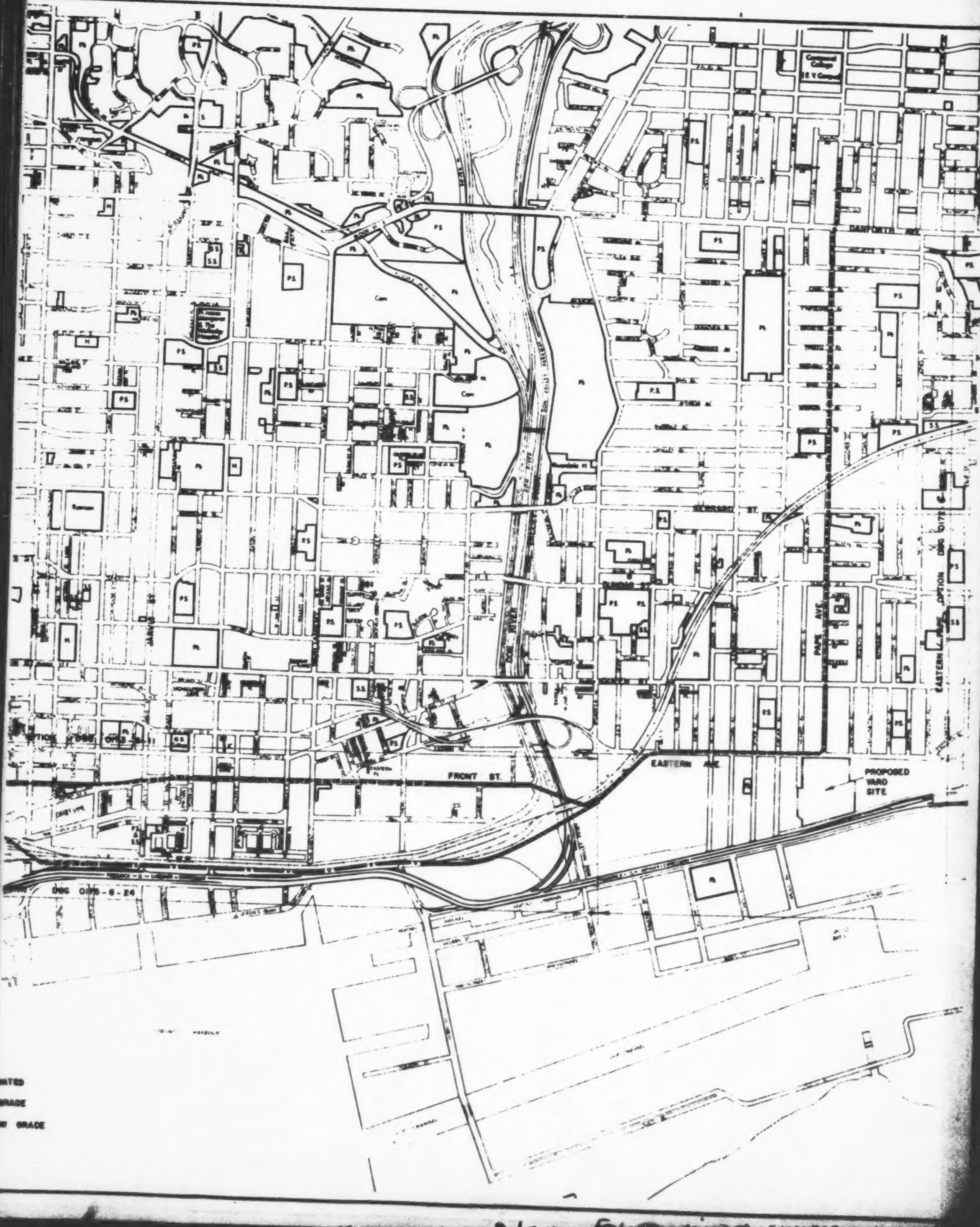


UofT
PS
SS
Pk
The Hospital for Sick Children
SPADINA AVE.
UNIVERSITY AVE.
DUNDAS ST.
QUEEN ST.
JARVIS ST.
WELLINGTON / FRONT OPTION / DOC. OPD-...
KING ST.
WELLINGTON ST.
FRONT ST.
UNION STATION
FRONT / RAILWAY OPTION DOC. OPD-6-24
WESTERN CHANNEL
LEGEND
ELEVATED
AT GRADE
BELOW GRADE

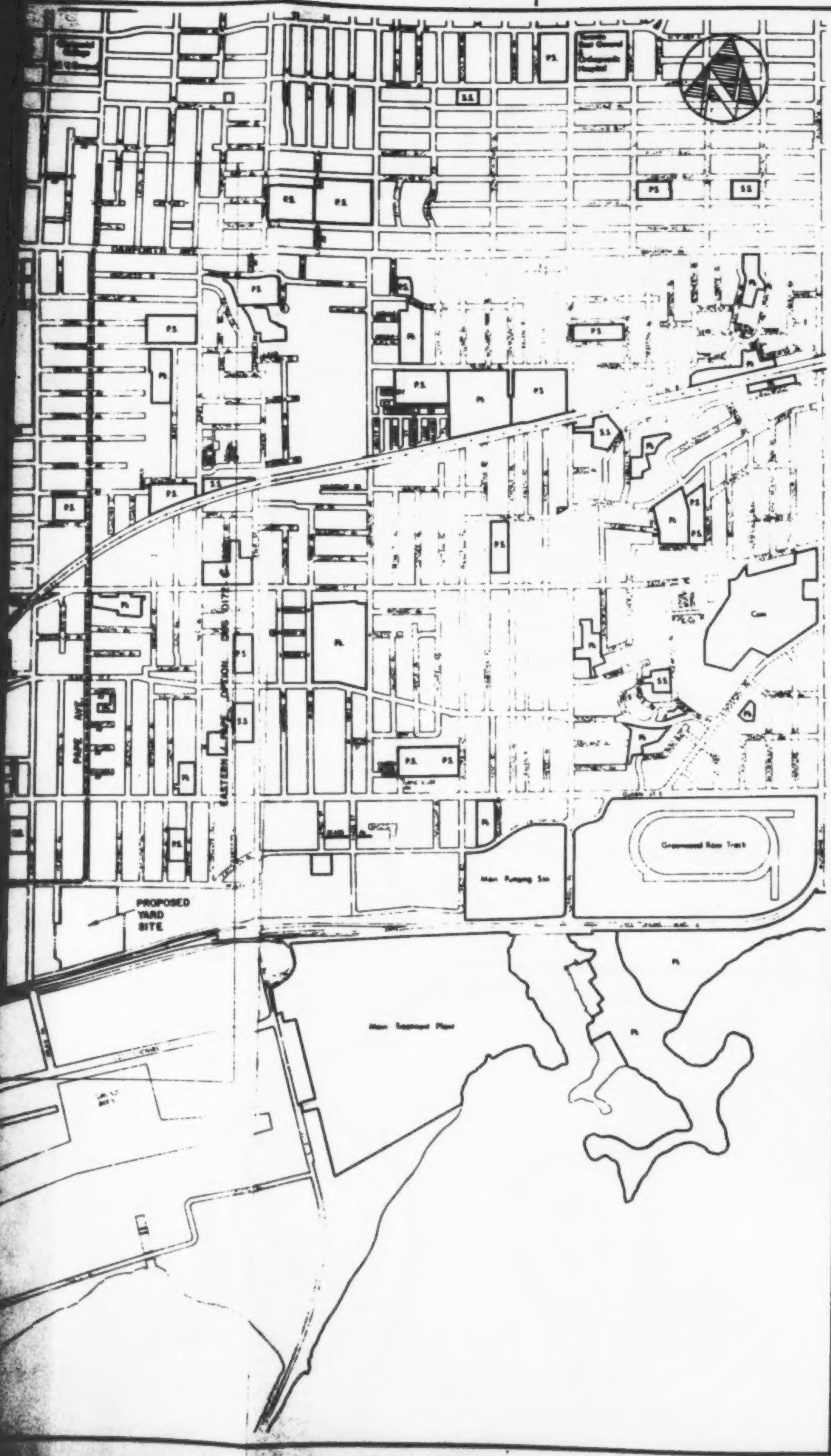
SHEET No.

DRAWING No.

A-2


DANFORTH AVE.
GERRARD ST.
PAPE AVE.
EASTERN AVE.
FRONT ST.
PROPOSED
YARD
SITE
DON RIVER
DON VALLEY PARKWAY
JARVIS ST.
DWG 0170-6-24
OPTION DWG 0170
EASTERN AVE. OPTION DWG 0172
PS
SS
Pk
Cem
H
NATED
GRADE
OW GRADE

A-3


DANFORTH AVE.
PAPE AVE.
EASTERN AVE. OPTION DWG 0172-G
P.S.
S.S.
Pk.
Com
PROPOSED YARD SITE
Greenwood Race Track
Main Pumping Stn
Main Treatment Plant

REVISIONS	
C.O.	
C.O.	
C.O.	
C.O.	
C.O.	
C.O.	

HALF SIZE REPRODUCTION SCALE ACCORDINGLY

REFERENCE DRAWINGS

APPROVED

TORONTO TRANSIT COMMISSION
ENGINEERING AND CONSTRUCTION

MANAGER OF ENGINEERING

GENERAL MANAGER

UNTIL SIGNED ABOVE THIS DRAWING MUST BE CONSIDERED PRELIMINARY

DRAWN R.HURST MAR. 1/85

CHECKED Jan '85

CORRECT Mar '85

SCALE
1 : 10 000

TORONTO TRANSIT
COMMISSION

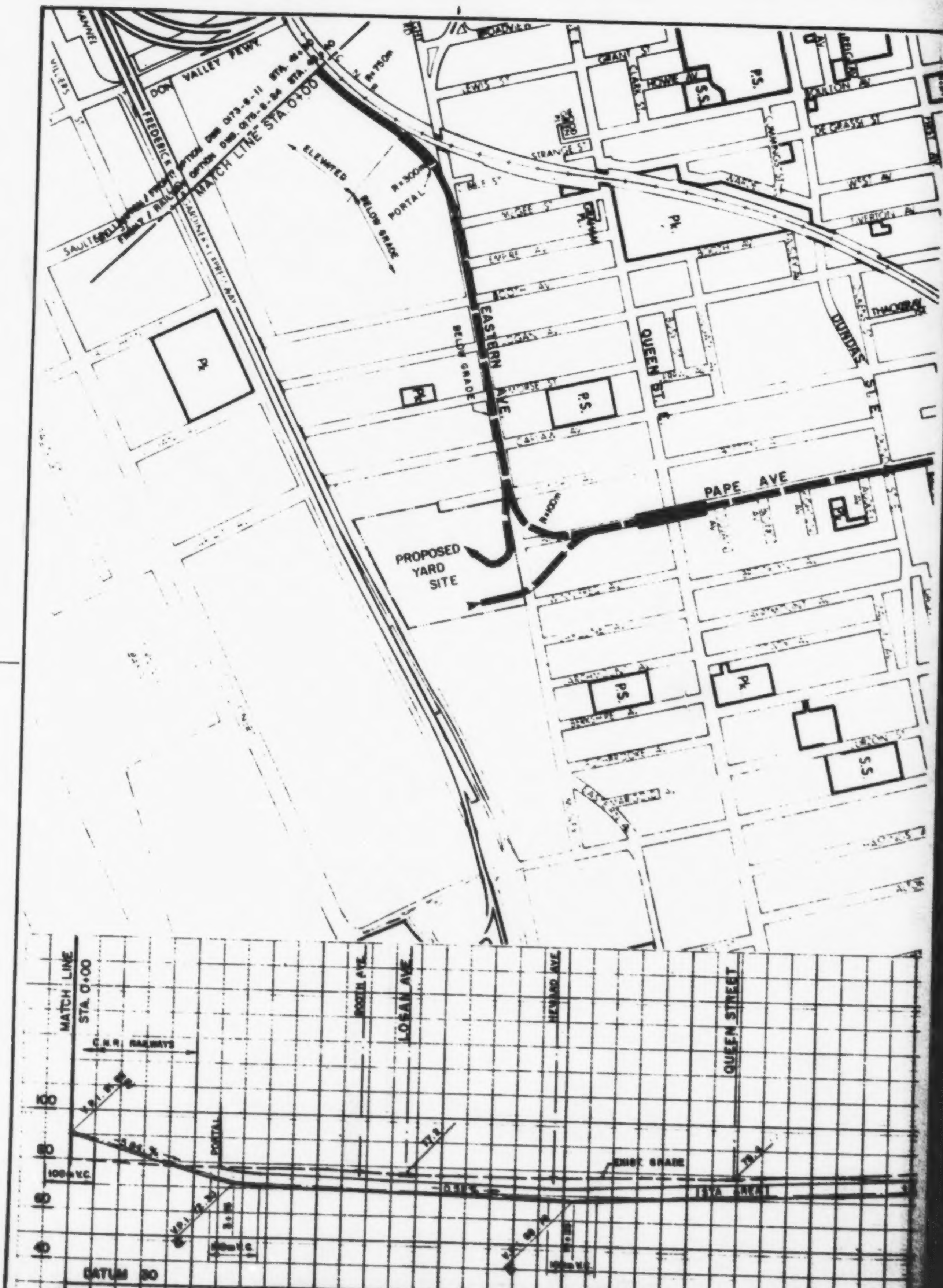
ENGINEERING DEPARTMENT

DOWNTOWN R/T

KEY PLAN

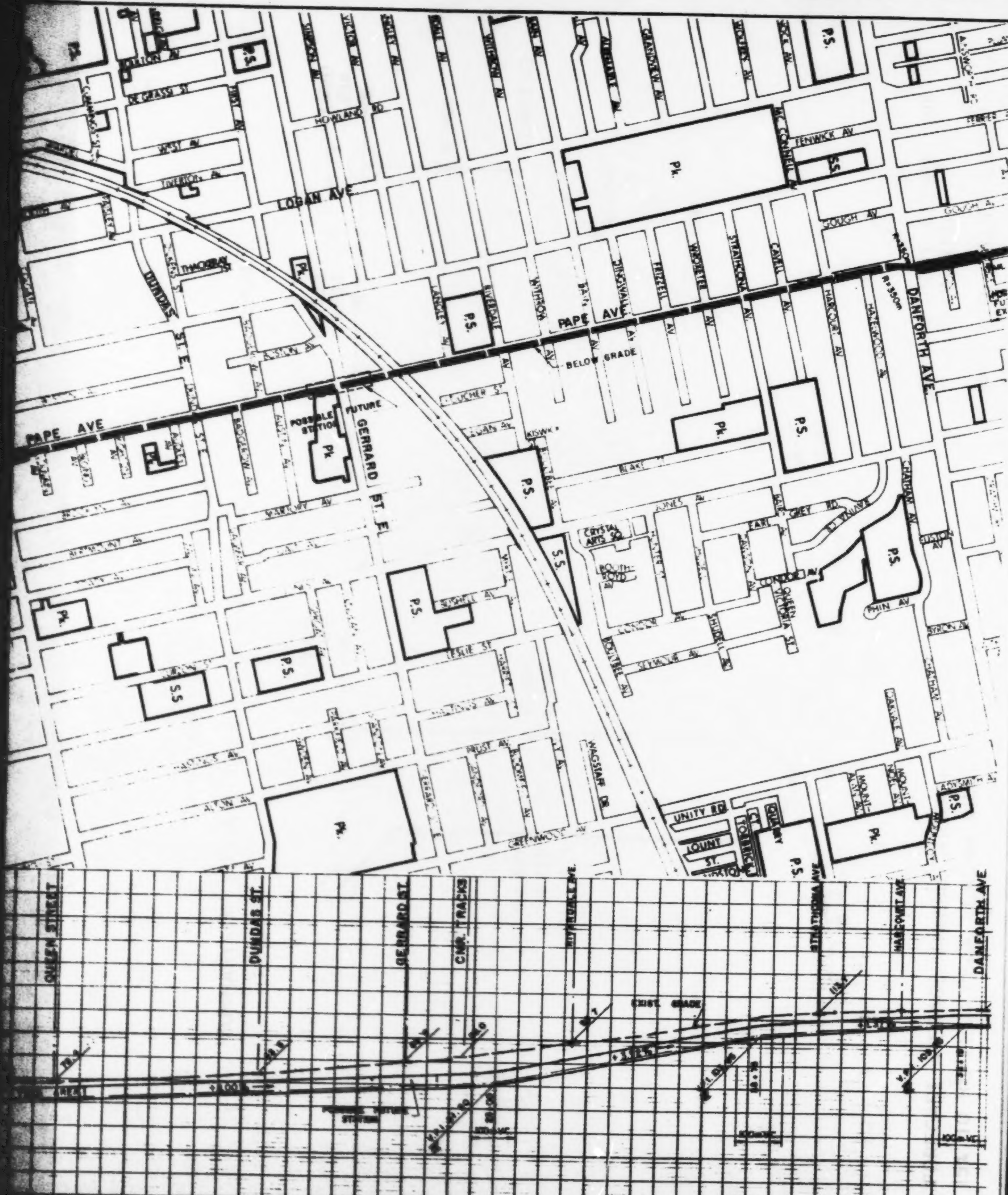
DWG. NO.
0172-G-54

B-1


CHANNEL
SAULTER ST
DON VALLEY PKWY.
FREDERICK ST
MATCH LINE STA. 0+00
ELEVATED
BELOW GRADE
PORTAL
R=300m
R=750m
BROADVIEW
GRANT ST
CLARK ST
HOWE AV
LEWIS ST
STRANGE ST
DE GRASSI ST
BOULTON AV
WEST AV
EMPIRE AV
THACKERAY ST
EASTERN AVE.
BELOW GRADE
QUEEN ST. E
DUNDAS ST. E
PAPE AVE
PROPOSED YARD SITE
P.S.
S.S.
Pk.
MATCH LINE STA. 0+00
C.N.R. RAILWAYS
BOOTH AVE.
LOGAN AVE.
HEWARD AVE.
QUEEN STREET
PORTAL
EXIST. GRADE
TOP RAIL
100m V.C.
100
80
60
40
DATUM 30
0+00
5+00
10+00
15+00

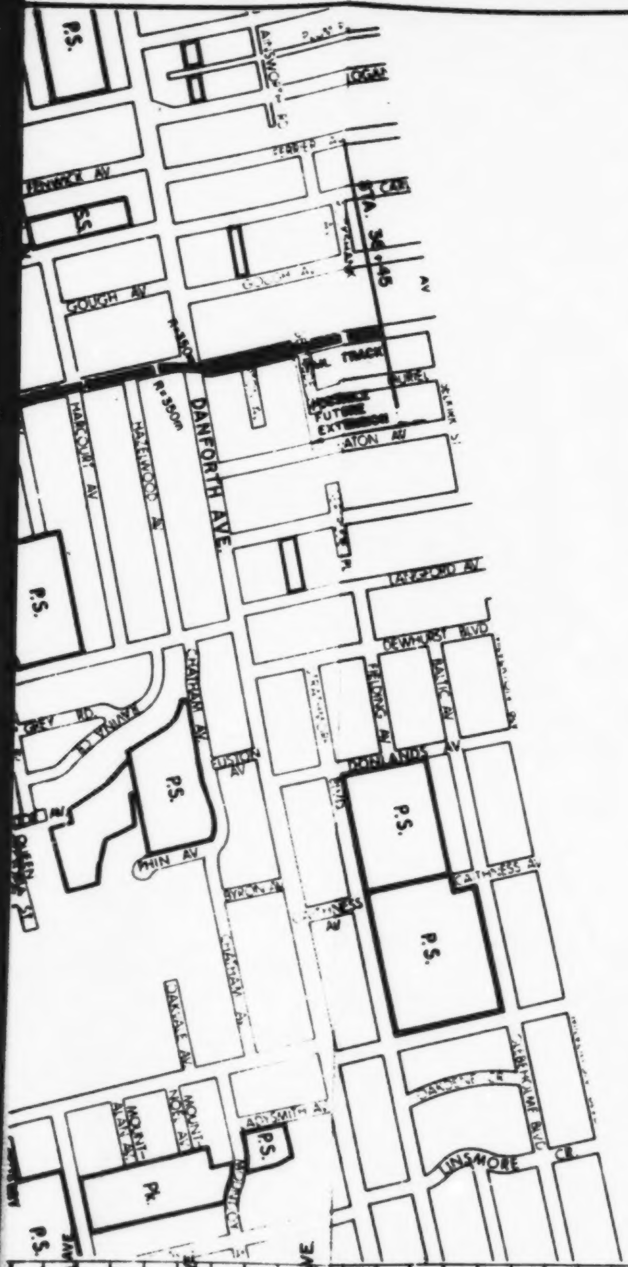
DRAWING No.

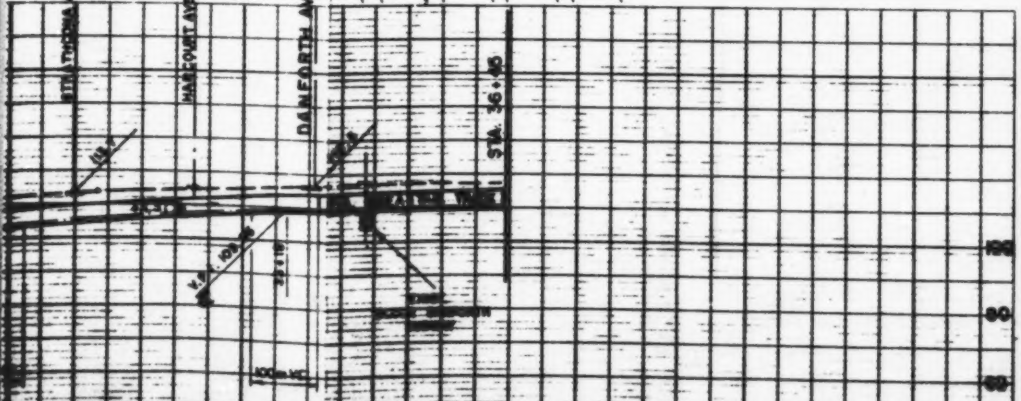
SHEET No.

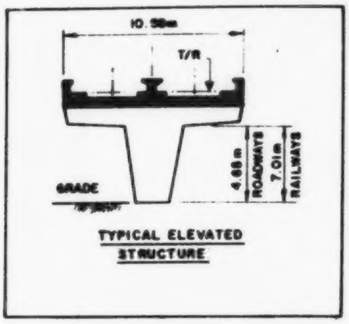

PAPE AVE
LOGAN AVE
DUNDAS ST E
GERRARD ST E
DANFORTH AVE
POSSIBLE FUTURE STATION
BELOW GRADE
R=300m
P.S.
S.S.
Pk.
DE GRASSI ST
HOWLAND RD
WEST AV
TIVERTON AV
THACKERAY ST
FENWICK AV
GOUGH AV
McCONNELL AV
HARCOURT AV
JONES AV
GREY RD
EARL
CRYSTAL ARTS SQ.
BOOTH-ROYD AV
CONDOR AV
QUEEN VICTORIA ST
PHIN AV
CHATHAM AV
EUSTON AV
LESLIE ST
WAGSTAFF DR
GREENWOOD AV
UNITY RD
LOUNT ST.
QUEEN STREET
DUNDAS ST.
GERRARD ST.
CNR. TRACKS
STRATHCONA AVE
HARCOURT AVE.
DANFORTH AVE
EXIST. GRADE
POSSIBLE FUTURE STATION
100m V.C.
15+00
20+00
25+00
30+00

F-2

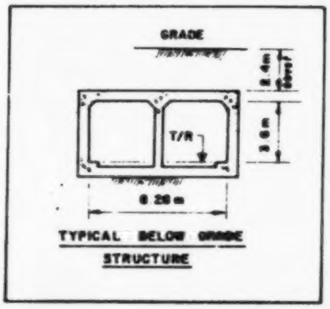
B-3


P.S.
LOGAN
FERRIER AV.
FENWICK AV
S.S.
STA. 36+45
GOUGH AV
RAIL TRACK
POSSIBLE FUTURE EXTENSION
R=350m
HARCOURT AV
HALLWOOD AV
DANFORTH AVE.
EATON AV
LANGFORD AV
DEWHURST BLVD
P.S.
GREY RD.
CHATHAM AV
FELSTEAD AV
EUSTON AV
DONLANDS AV
P.S.
PHIN AV
BYRON AV
CAITHNESS AV
P.S.
OAKVALE AV
CHATHAM AV
MOUNT ROYAL AV
ASHSMITH AV
P.S.
PK.
LINSMORE CR.
P.S.




10.56m
T/R
GRADE
4.66m ROADWAYS
7.01m RAILWAYS

TYPICAL ELEVATED STRUCTURE


GRADE
2.4m
3.6m
T/R
8.26m

TYPICAL BELOW GRADE STRUCTURE

REVISIONS

C.O. / /	
C.O. / /	
C.O. / /	
C.O. / /	
C.O. / /	
C.O. / /	

HALF SIZE
SCALE ACCORDINGLY
REPRODUCTION

REFERENCE DRAWINGS

APPROVED

TORONTO TRANSIT COMMISSION
ENGINEERING AND CONSTRUCTION

H. Raptek
for [illegible]

for [illegible]

[illegible]

DRAWN A.W. GALLOP AUG. /84
CHECKED [illegible] [illegible] '85
CORRECT J.M. [illegible] Mar. '85
SCALE
HOR. 1:5000
VERT. 1:1000

TORONTO TRANSIT COMMISSION
ENGINEERING DEPARTMENT

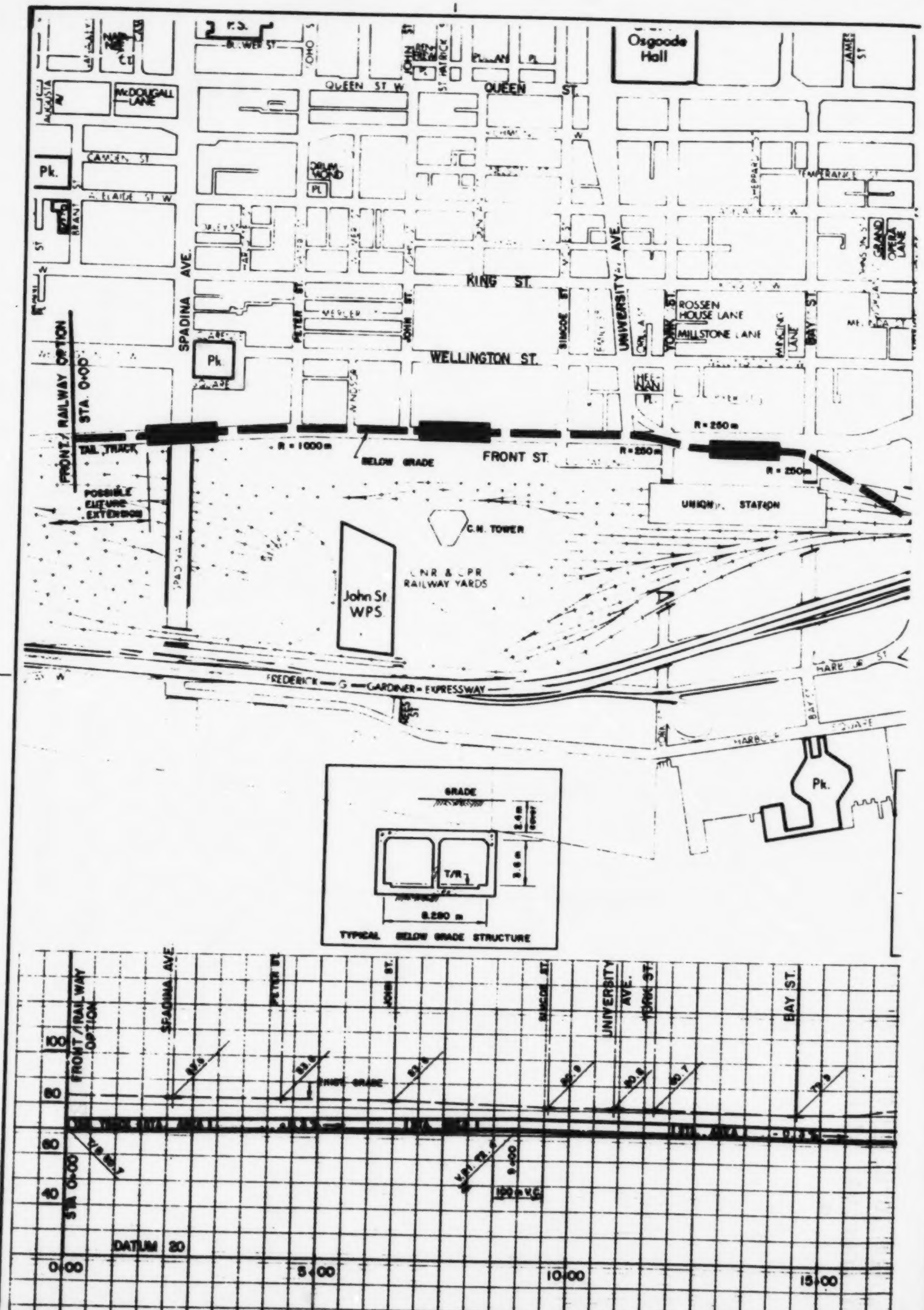
DOWNTOWN R/T.
EAST SECTION

EASTERN AVE.-PAPE AVE. OPTION

PLAN & PROFILE
SHEET 1 OF 1

DWG. NO.
0172-G-416

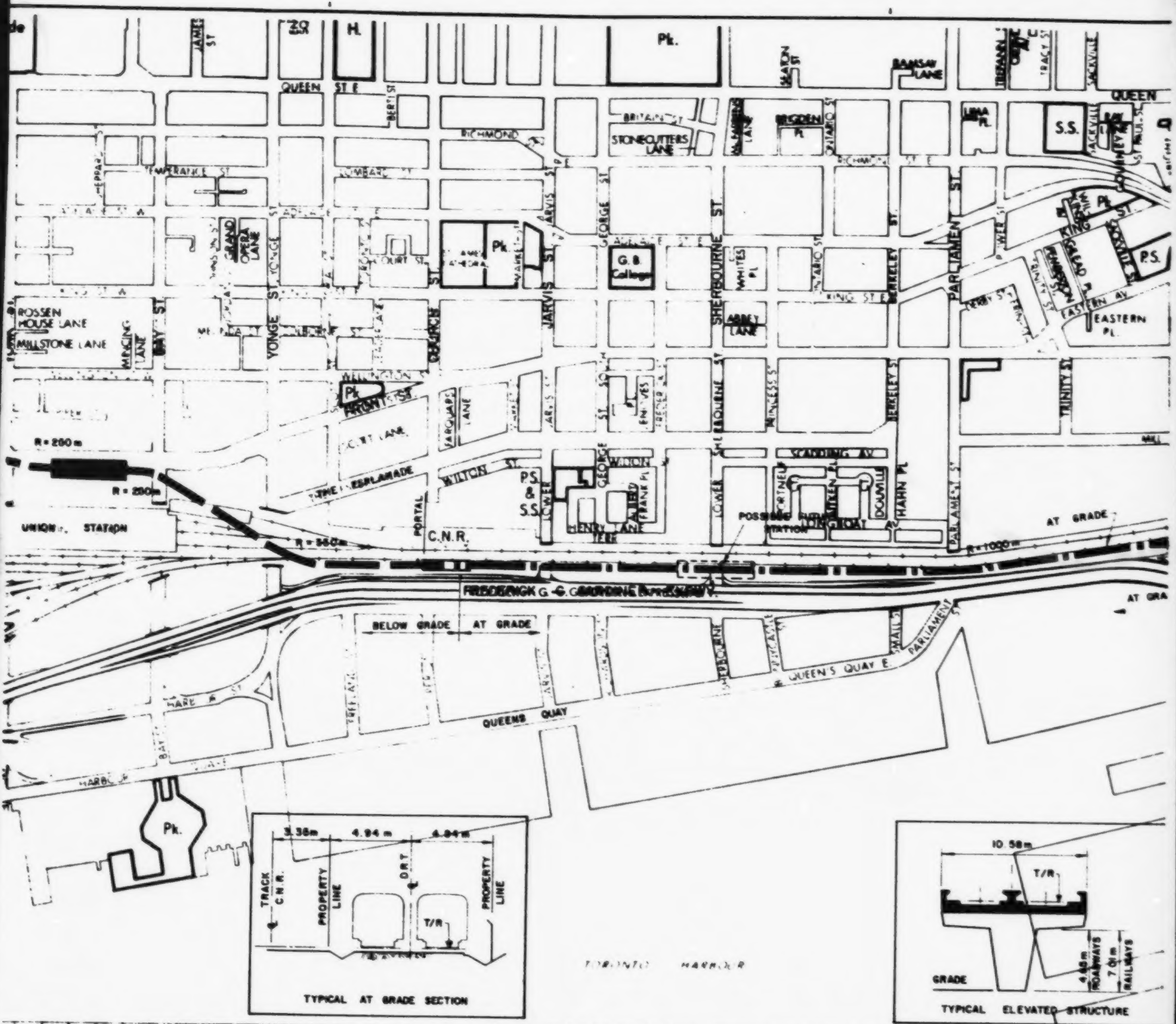
C-1

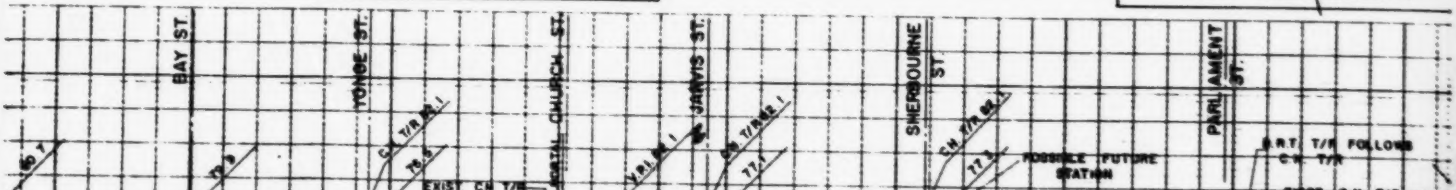

Osgoode Hall
QUEEN ST W
QUEEN ST.
McDOUGALL LANE
CAMDEN ST
ADELAIDE ST W
Pk.
SPADINA AVE.
PETER ST.
JOHN ST.
SIMCOE ST.
UNIVERSITY AVE.
YORK ST.
BAY ST.
KING ST.
ROSSEN HOUSE LANE
MILLSTONE LANE
MERCER
WELLINGTON ST.
GRAND OPERA LANE
TEMPERANCE ST
FRONT / RAILWAY OPTION
STA. 0+00
TAIL TRACK
R = 1000 m
BELOW GRADE
FRONT ST.
R = 250 m
R = 250 m
R = 200 m
POSSIBLE FUTURE EXTENSION
UNION STATION
C.N. TOWER
C.N.R. & C.P.R. RAILWAY YARDS
John St. WPS
FREDERICK G. GARDINER EXPRESSWAY
HARBOUR ST
HARBOUR SQUARE
GRADE
2.4 m
3.8 m
T/R
8.280 m
TYPICAL BELOW GRADE STRUCTURE
FRONT / RAILWAY OPTION
SPADINA AVE
PETER ST.
JOHN ST.
SIMCOE ST.
UNIVERSITY AVE.
YORK ST.
BAY ST.
100
80
60
40
EXIST. GRADE
STA 0+00
100 m V.C.
DATUM 20
0+00
5+00
10+00
15+00

SHEET No.

DRAWING No.

C-2

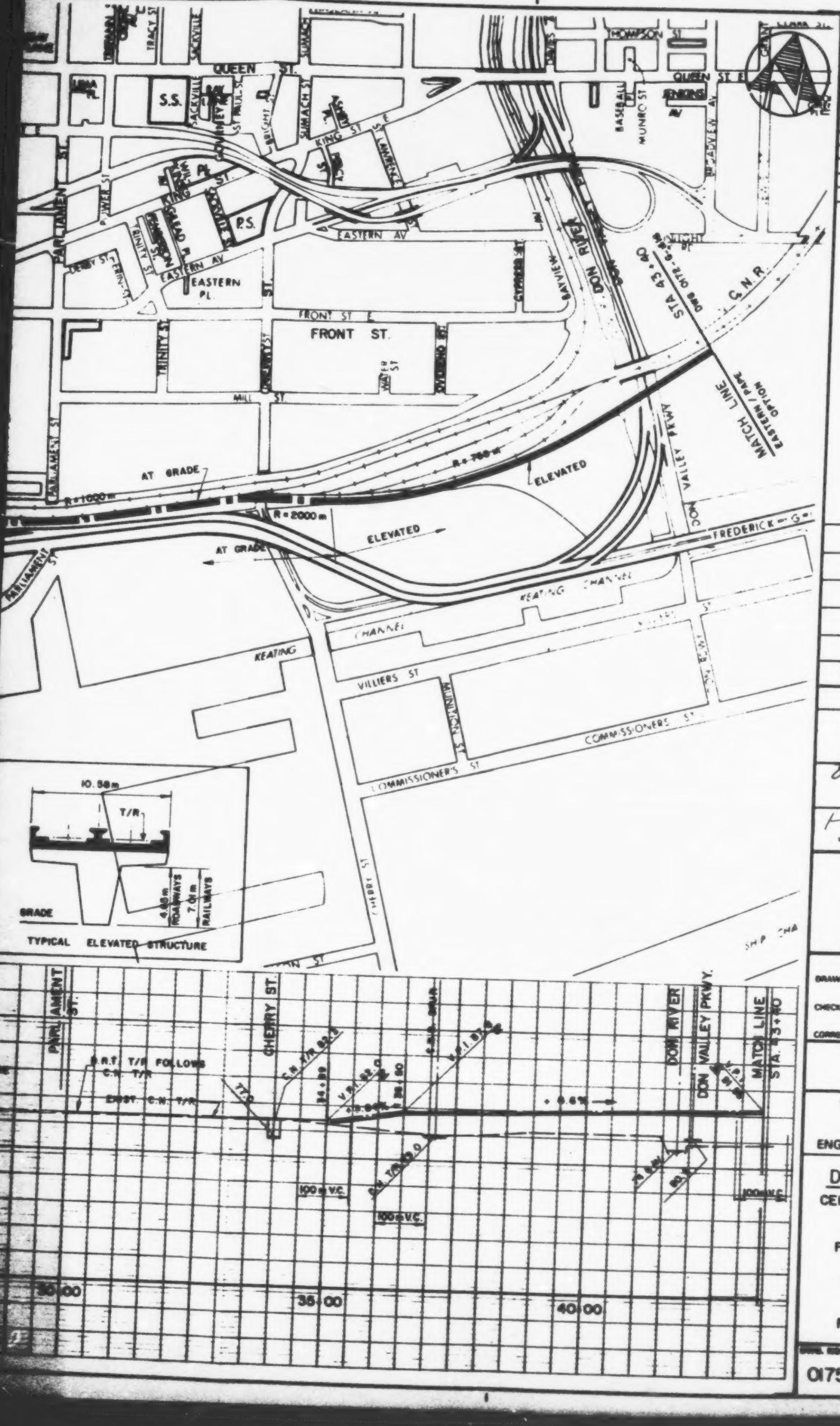

QUEEN ST E
RICHMOND ST
ADELAIDE ST
KING ST E
FRONT ST
THE ESPLANADE
WILTON ST
YONGE ST
BAY ST
CHURCH
JARVIS ST
GEORGE ST
SHERBOURNE ST
BERKELEY ST
PARLIAMENT
SACKVILLE
TRINITY ST
STONECUTTERS LANE
ROSSEN HOUSE LANE
MILLSTONE LANE
SCADDING AV
LONGBOAT AV
HAHN PL.
EASTERN AV
EASTERN PL.
G.B. College
Pk.
S.S.
P.S.
P.S. & S.S.
UNION STATION
C.N.R.
R = 200 m
R = 200 m
R = 550 m
R = 1000 m
AT GRADE
POSSIBLE FUTURE STATION
FREDERICK G. GARDINER EXPRESSWAY
BELOW GRADE
AT GRADE
QUEEN'S QUAY E
QUEENS QUAY
HARBOUR ST
TORONTO HARBOUR
3.36m
4.94 m
4.94 m
TRACK C.N.R.
PROPERTY LINE
D.R.T.
T/R
PROPERTY LINE
TYPICAL AT GRADE SECTION
10.58m
T/R
GRADE
4.65m ROADWAYS
7.01m RAILWAYS
TYPICAL ELEVATED STRUCTURE


BAY ST.
YONGE ST.
CHURCH ST.
JARVIS ST.
SHERBOURNE ST
PARLIAMENT ST.
EXIST. C.N. T/R
PORTAL
V.P.I.
100 m V.C.
100 m V.C.
POSSIBLE FUTURE STATION
D.R.T. T/R FOLLOWS C.N. T/R
EXIST C.N. T/R
15+00
20+00
25+00
30+00

PROFILE

E-3

C-3


TRACY ST
SACKVILLE
QUEEN ST.
THOMPSON ST
QUEEN ST E
S.S.
SACKVILLE
ST PAUL ST
BRIGHT ST
SUMACH ST
KING ST E
LAWRENCE
BASEBALL PL
MUNRO ST
JENKINS AV
EASTERN AV
PARLIAMENT ST
POWER ST
KING ST
P.S.
EASTERN AV
DERBY ST
TRINITY ST
EASTERN PL
FRONT ST E
FRONT ST.
CYPRESS ST
BAYVIEW
DON RIVER
DON VALLEY PKWY
STA 43+40
C.N.R.
MATCH LINE
EASTERN / PAPE OPTION
TRINITY ST
WATER ST
MILL ST
PARLIAMENT ST
AT GRADE
R=1000 m
R=750 m
ELEVATED
R=2000 m
ELEVATED
AT GRADE
FREDERICK G
KEATING CHANNEL
KEATING
VILLIERS ST
COMMISSIONERS ST
COMMISSIONER'S ST
CHERRY ST
SHIP CHA
10.58 m
T/R
4.65 m ROADWAYS
7.01 m RAILWAYS
GRADE
TYPICAL ELEVATED STRUCTURE
PARLIAMENT ST.
CHERRY ST.
R.R.T. T/R FOLLOWS C.N. T/R
EXIST. C.N. T/R
T/O
C.N. T/R 82.1
34+20
V.P.I. 82.0
36.90
C.N.R. SPUR
V.P.I. 83.0
+0.6%
DON RIVER
DON VALLEY PKWY.
MATCH LINE STA. 43+40
C.N. T/R 80.0
100 m V.C.
100 m V.C.
100 m V.C.
30+00
35+00
40+00

REVISIONS

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HALF SIZE
SCALE ACCORDINGLY
REPRODUCTION

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F.K. Pajtlek
for MANAGER OF ENGINEERING

R. Mate
for GENERAL MANAGER

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CHECKED Ma '85

CORRECT Mar '85

SCALE
HOR. 1 : 5000
VER. 1 : 2000

TORONTO TRANSIT COMMISSION

ENGINEERING DEPARTMENT

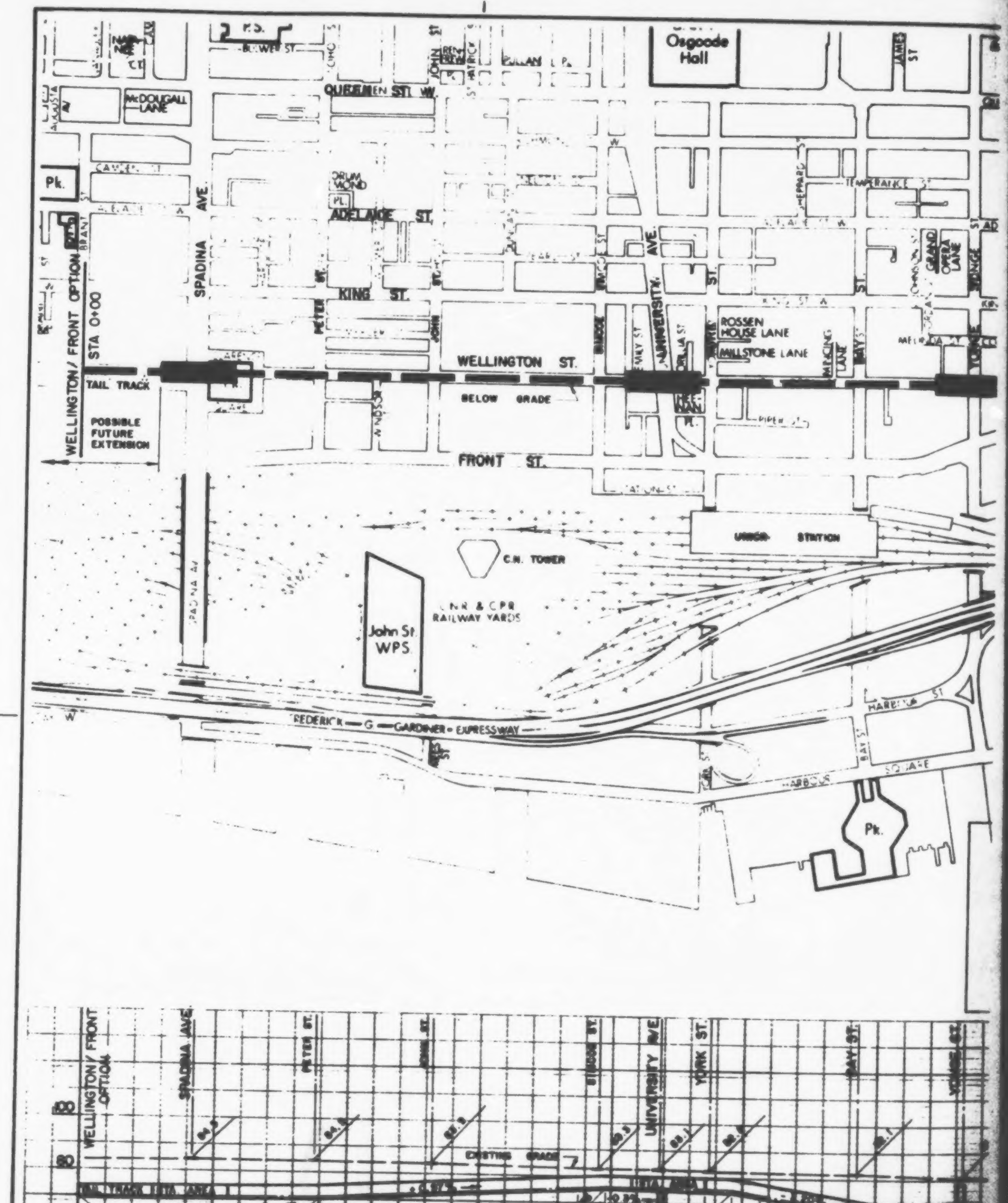
DOWNTOWN R/T
CENTRAL SECTION

FRONT / RAILWAY OPTION
(BELOW GRADE)

PLAN & PROFILE

DWG. NO.
0175-G-24

D-1

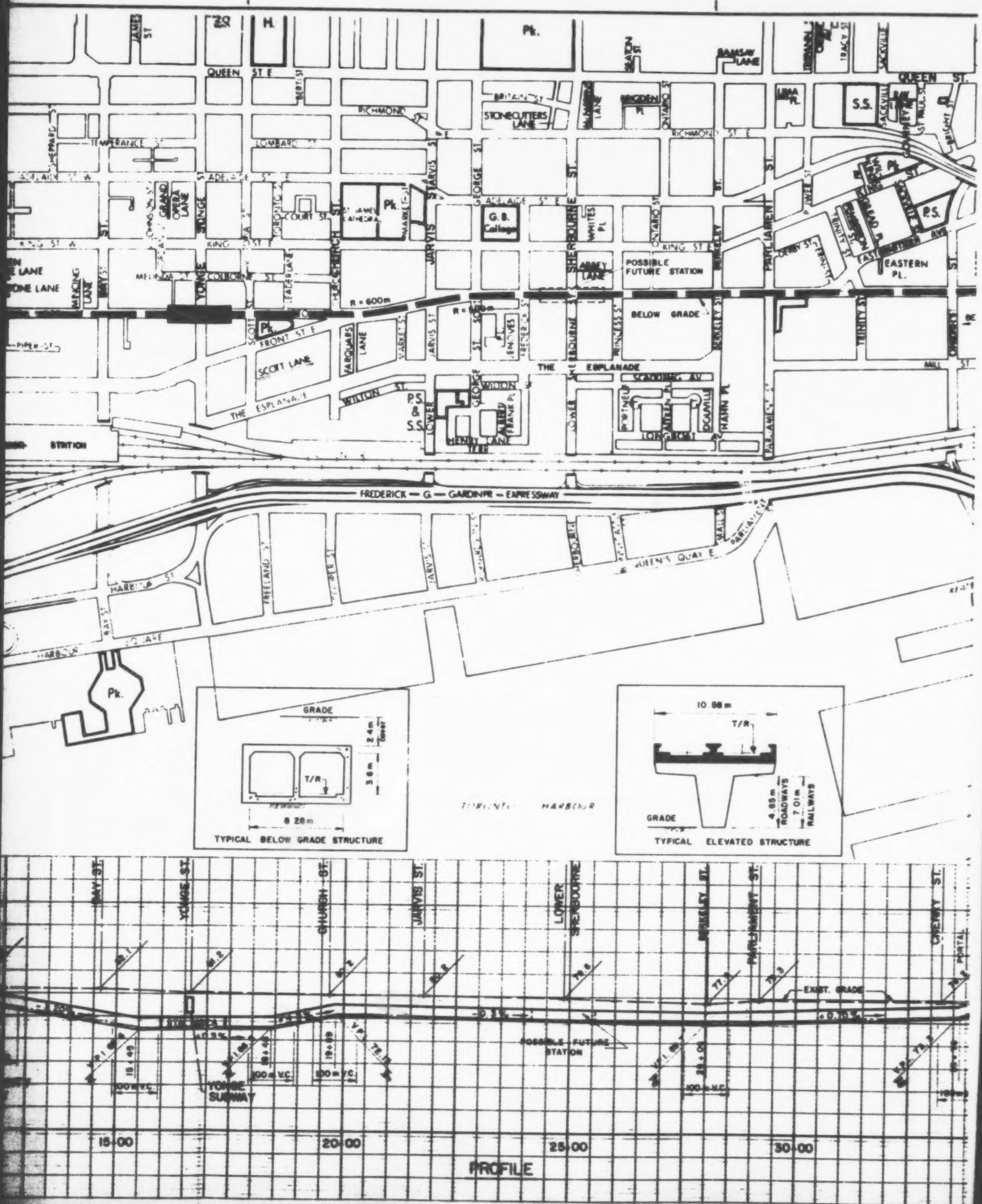


Osgoode Hall
QUEEN ST. W.
McDOUGALL LANE
Pk.
DRUMMOND PL.
ADELAIDE ST.
SPADINA AVE.
BRANT ST.
PETER ST.
KING ST.
JOHN ST.
SIMCOE ST.
UNIVERSITY AVE.
YORK ST.
BAY ST.
YONGE ST.
TEMPERANCE ST.
GRAND OPERA LANE
ROSSEN HOUSE LANE
MILLSTONE LANE
MINCING LANE
MELINDA ST.
WELLINGTON ST.
WINDSOR ST.
BELOW GRADE
PIPER ST.
FRONT ST.
WELLINGTON/ FRONT OPTION
STA 0+00
TAIL TRACK
POSSIBLE FUTURE EXTENSION
UNION STATION
C.N. TOWER
CNR & CPR RAILWAY YARDS
John St. WPS.
SPADINA AV.
FREDERICK G. GARDINER EXPRESSWAY
HARBOUR ST.
BAY ST.
HARBOUR SQUARE
Pk.
WELLINGTON/ FRONT OPTION
SPADINA AVE.
PETER ST.
JOHN ST.
SIMCOE ST.
UNIVERSITY AVE.
YORK ST.
BAY ST.
YONGE ST.
100
80
60
40
EXISTING GRADE
0.3%
STA. 0+00
100m V.C.
UNIVERSITY SUBWAY
DATUM 20
0+00
5+00
10+00
15+00

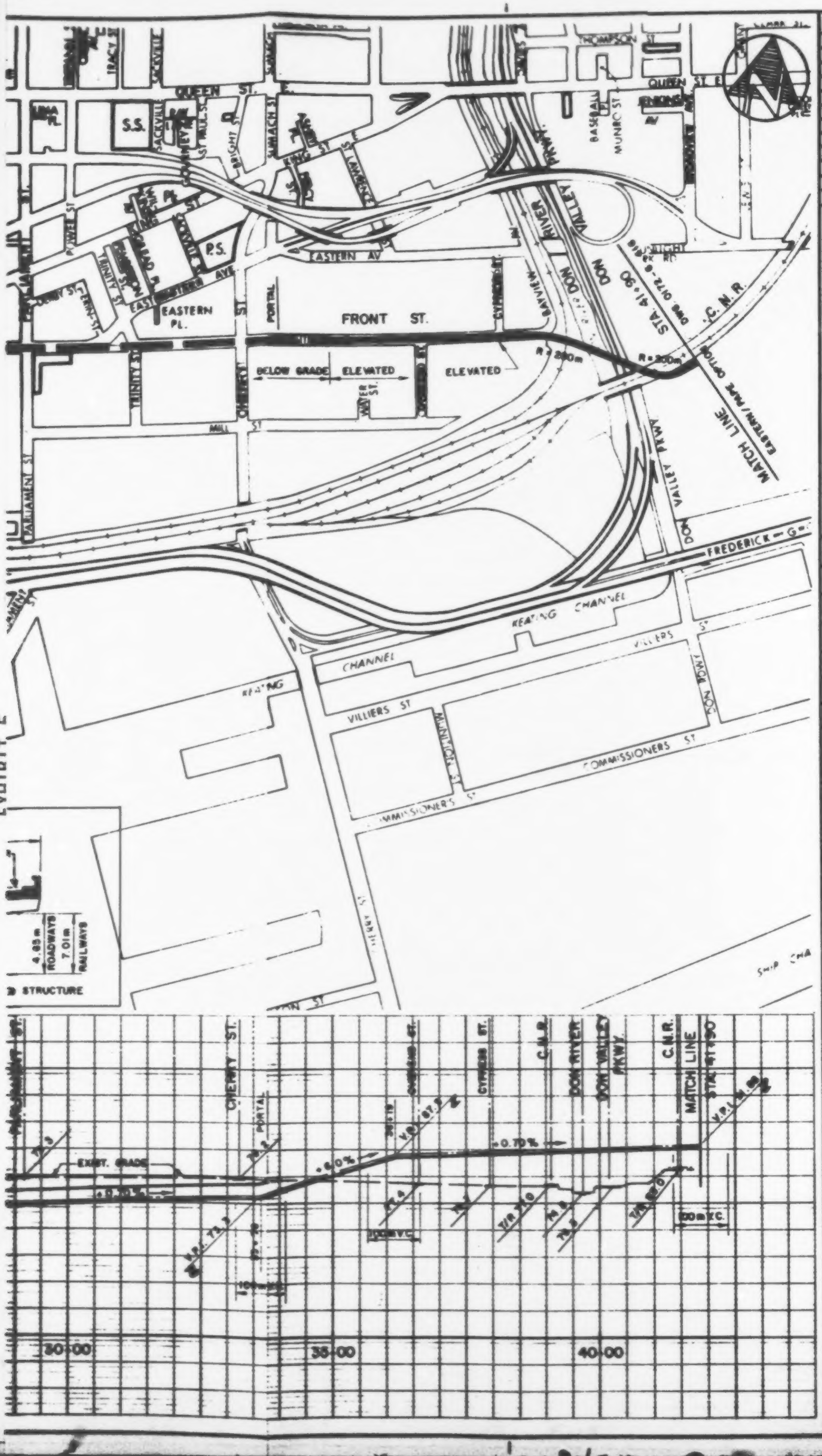
SHEET No.

DRAWING No.

D-2


QUEEN ST E
QUEEN ST.
RICHMOND ST
RICHMOND ST E
TEMPERANCE ST
LOMBARD ST
ADELAIDE ST W
ADELAIDE ST E
KING ST W
KING ST E
COLBORNE ST
MELINDA ST
FRONT ST E
THE ESPLANADE
WILTON ST
SCOTT LANE
FARQUHARS LANE
STONECUTTERS LANE
BRITAIN ST
COURT ST.
ST JAMES CATHEDRAL
G.B. College
ABBEY LANE
POSSIBLE FUTURE STATION
BELOW GRADE
R = 600m
EASTERN AVE.
EASTERN PL.
S.S.
P.S.
P.S. & S.S.
Pk.
H.
FREDERICK — G — GARDINER — EXPRESSWAY
QUEEN'S QUAY E.
HARBOUR ST
HARBOUR SQUARE
FREELAND ST
JARVIS ST
SHERBOURNE ST
PARLIAMENT ST
BERKELEY ST
CHURCH ST
YONGE ST
BAY ST
GEORGE ST
MILL ST
CHERRY ST
SCADDING AV
LONGBOAT AV
HENRY LANE TERR
STATION
TORONTO HARBOUR
GRADE
2.4m
3.6m
T/R
8.28m
TYPICAL BELOW GRADE STRUCTURE
10.88m
T/R
4.65m ROADWAYS
7.01m RAILWAYS
GRADE
TYPICAL ELEVATED STRUCTURE
BAY ST.
YONGE ST.
CHURCH ST.
JARVIS ST.
LOWER SHERBOURNE
BERKELEY ST.
PARLIAMENT ST.
CHERRY ST.
EXIST. GRADE
PORTAL
POSSIBLE FUTURE STATION
YONGE SUBWAY
100 m V.C.
0.3%
0.70%
15+00
20+00
25+00
30+00
PROFILE

D-3


QUEEN ST E
THOMPSON ST
SACKVILLE
S.S.
P.S.
KING ST
EASTERN AV
EASTERN AVE
EASTERN PL.
FRONT ST.
TRINITY ST
CHERRY ST
PORTAL
BELOW GRADE
ELEVATED
WATER ST.
MILL ST
CYPRESS ST
BAYVIEW
DON RIVER
DON VALLEY PKWY
C.N.R.
R=200m
R=300m
STA. 41+90
MATCH LINE
EASTERN/FRONT OPTION
PARLIAMENT ST
FREDERICK G
KEATING CHANNEL
VILLIERS ST
COMMISSIONERS ST
CHERRY ST
DON ROWY
SHIP CHA
4.65m ROADWAYS
7.01m RAILWAYS
STRUCTURE
EXIST. GRADE
+6.0%
-0.70%
100m V.C.
V.P.I.
MATCH LINE STA. 41+90
30+00
35+00
40+00

HALF SIZE
SCALE ACCORDINGLY
REPRODUCTION

REVISIONS

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GRaytek
MANAGER OF ENGINEERING

21mat
GENERAL MANAGER

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CHECKED Mar '85
CORRECT Mar '85

SCALE
HOR 1:5000
VER 1:2000

TORONTO TRANSIT COMMISSION

ENGINEERING DEPARTMENT

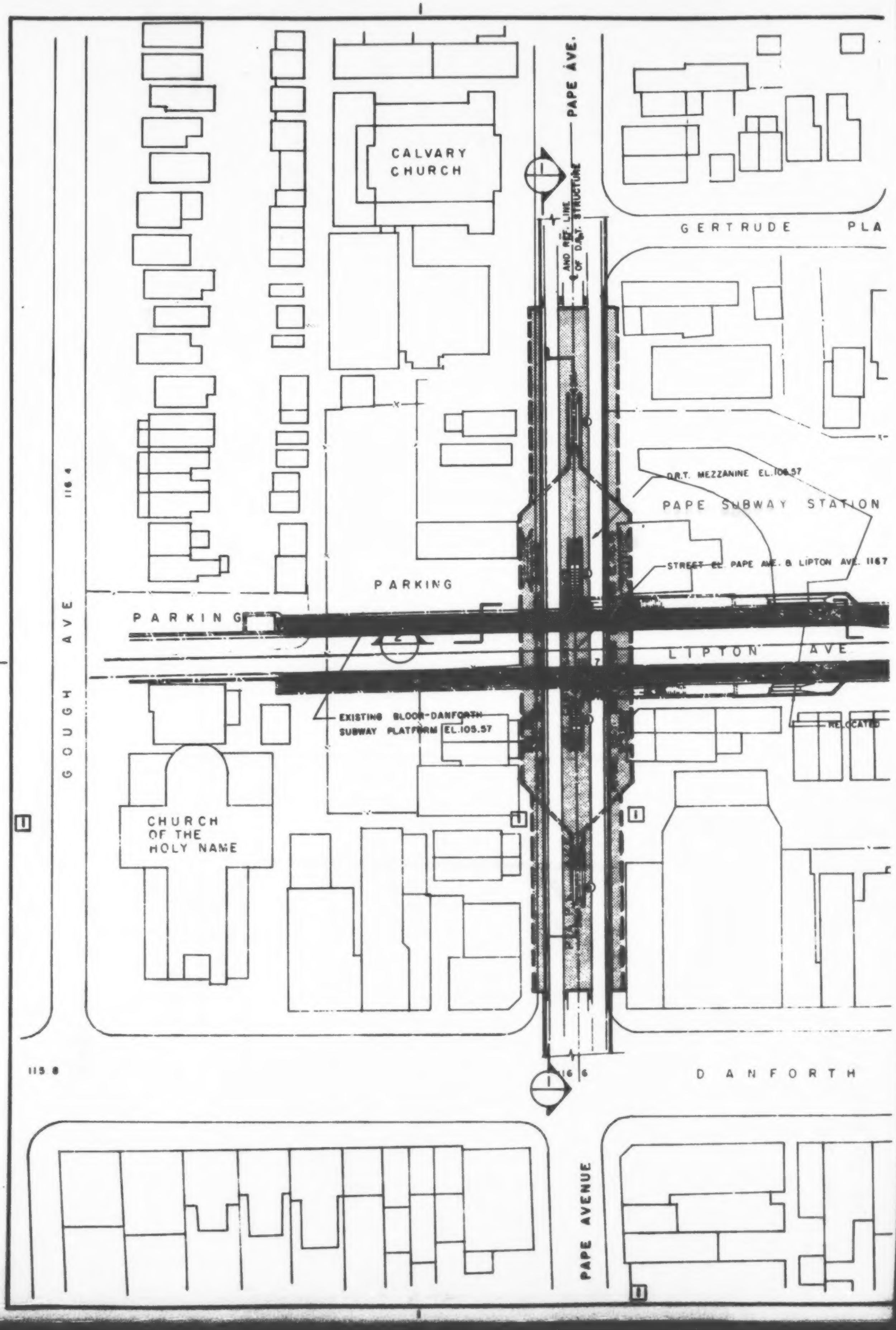
DOWNTOWN R/T
CENTRAL SECTION

WELLINGTON. / FRONT OPTION
(BELOW GRADE)

PLAN & PROFILE

DWG. NO.
0173-G-11

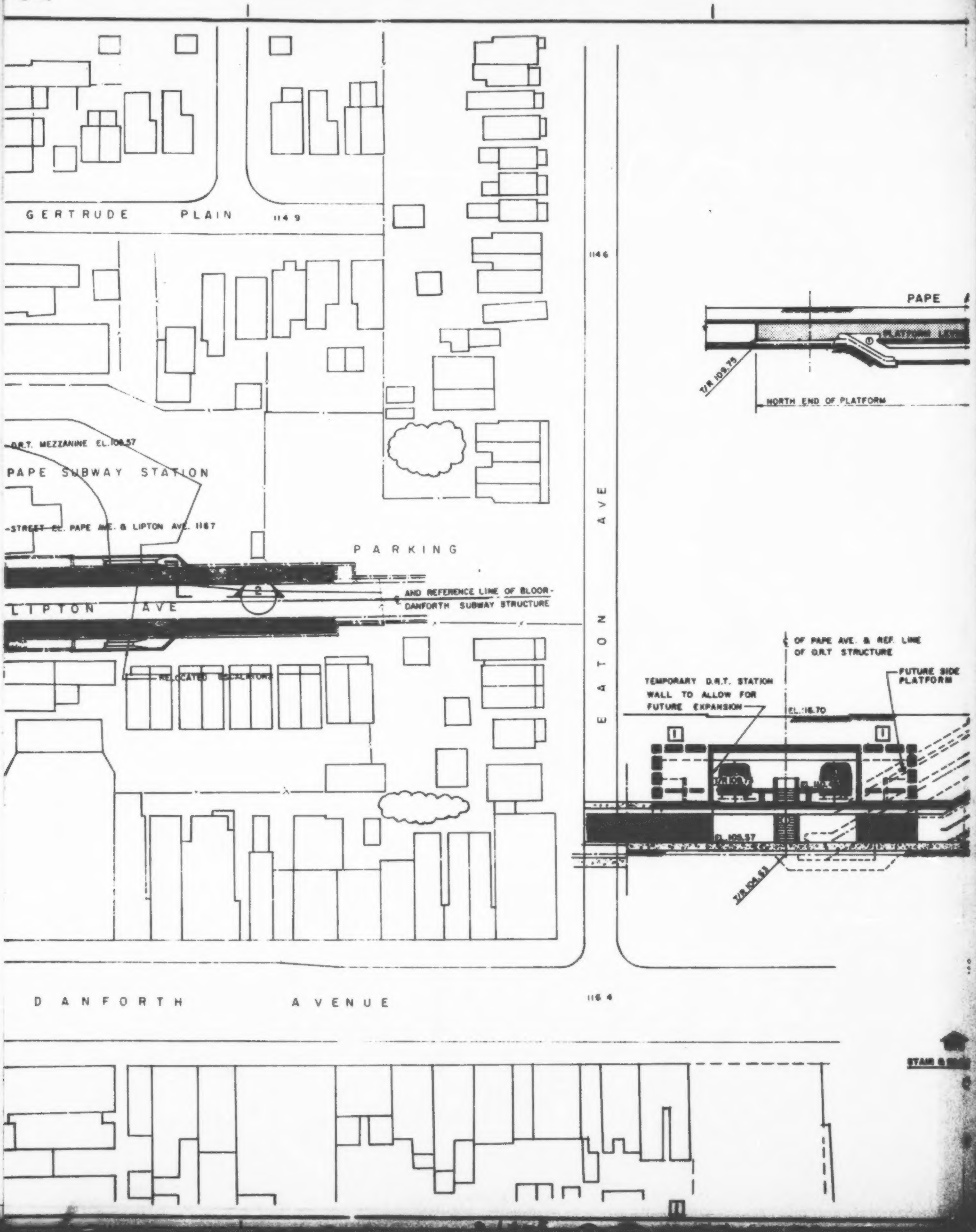
E-1


PAPE AVE.
CALVARY CHURCH
GERTRUDE PLA
AND REF. LINE OF D.R.T. STRUCTURE
D.R.T. MEZZANINE EL.106.57
PAPE SUBWAY STATION
STREET EL. PAPE AVE. & LIPTON AVE. 116.7
116.4
PARKING
PARKING
LIPTON AVE
2
7
EXISTING BLOOR-DANFORTH SUBWAY PLATFORM EL.105.57
RELOCATED
GOUGH AVE
CHURCH OF THE HOLY NAME
1
115.8
116.6
DANFORTH
PAPE AVENUE

SHEET No.

DRAWING No.

E-2


GERTRUDE PLAIN
114 9
114 6
PAPE
PLATFORM
T/R 109.75
NORTH END OF PLATFORM
D.R.T. MEZZANINE EL. 108.57
PAPE SUBWAY STATION
STREET EL. PAPE AVE. & LIPTON AVE. 116 7
PARKING
2
LIPTON AVE
℄ AND REFERENCE LINE OF BLOOR-DANFORTH SUBWAY STRUCTURE
RELOCATED ESCALATORS
EATON AVE
℄ OF PAPE AVE. & REF. LINE OF D.R.T STRUCTURE
TEMPORARY D.R.T. STATION WALL TO ALLOW FOR FUTURE EXPANSION
FUTURE SIDE PLATFORM
EL. 116.70
EL. 109.37
T/R 104.63
DANFORTH AVENUE
116 4
STAIR &

E-3

REVISIONS	
1 C.O. FEB. [illegible]	SOLID LINE CHANGED TO DOTTED INDICATION FOR FUTURE EXPANSION
C.O.	
C.O.	
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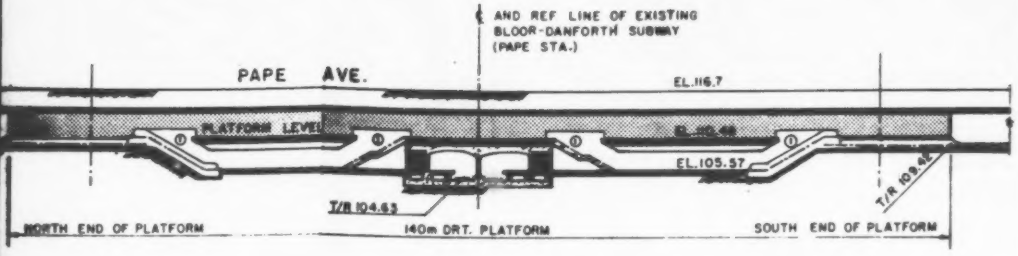
C.O.	


AND REF LINE OF EXISTING BLOOR-DANFORTH SUBWAY (PAPE STA.)
PAPE AVE.
EL.116.7
PLATFORM LEVEL
EL.110.48
EL.105.57
①
T/R 104.63
T/R 109.42
NORTH END OF PLATFORM
140m DRT. PLATFORM
SOUTH END OF PLATFORM

SECTION 1-1

REFERENCE DRAWINGS

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MANAGER OF ENGINEERING

GENERAL MANAGER

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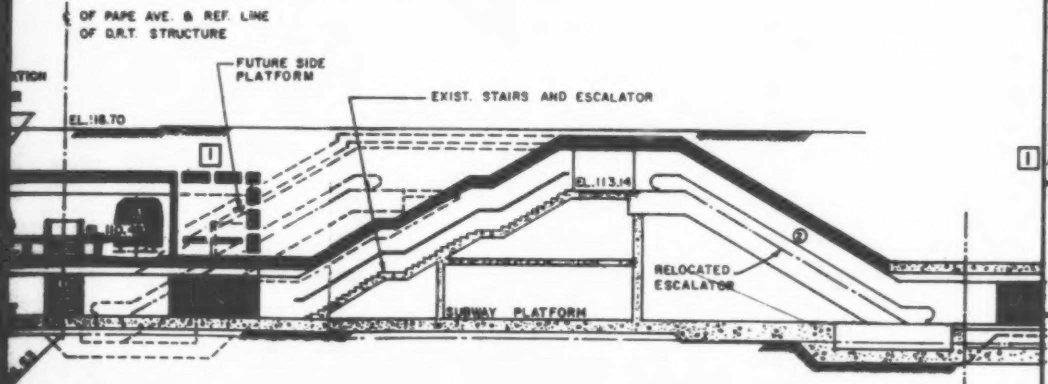

OF PAPE AVE. & REF. LINE OF D.R.T. STRUCTURE
FUTURE SIDE PLATFORM
EXIST. STAIRS AND ESCALATOR
EL.116.70
1
EL.113.14
②
RELOCATED ESCALATOR
SUBWAY PLATFORM

SECTION 2-2

SCALE 1:200

PEDESTRIAN MOVEMENT

STAIR & ESC. No.	DIRECTION
①	EXISTING SUBWAY PLATFORM AND NEW MEZZ. GOING UP TO D.R.T. PLATFORM
②	EXISTING SUBWAY PLATFORM GOING UP TO EXISTING MEZZANINE

DRAWN [illegible]
CHECKED [illegible] Dalton Sept/84.
CORRECT [illegible] Mar '85
SCALE 0 5 10 15 20 m
1:500

TORONTO TRANSIT COMMISSION

ENGINEERING DEPARTMENT

DOWNTOWN R/T

PAPE AVE. OPTION

BELOW GRADE

PAPE & LIPTON AVE. STATION

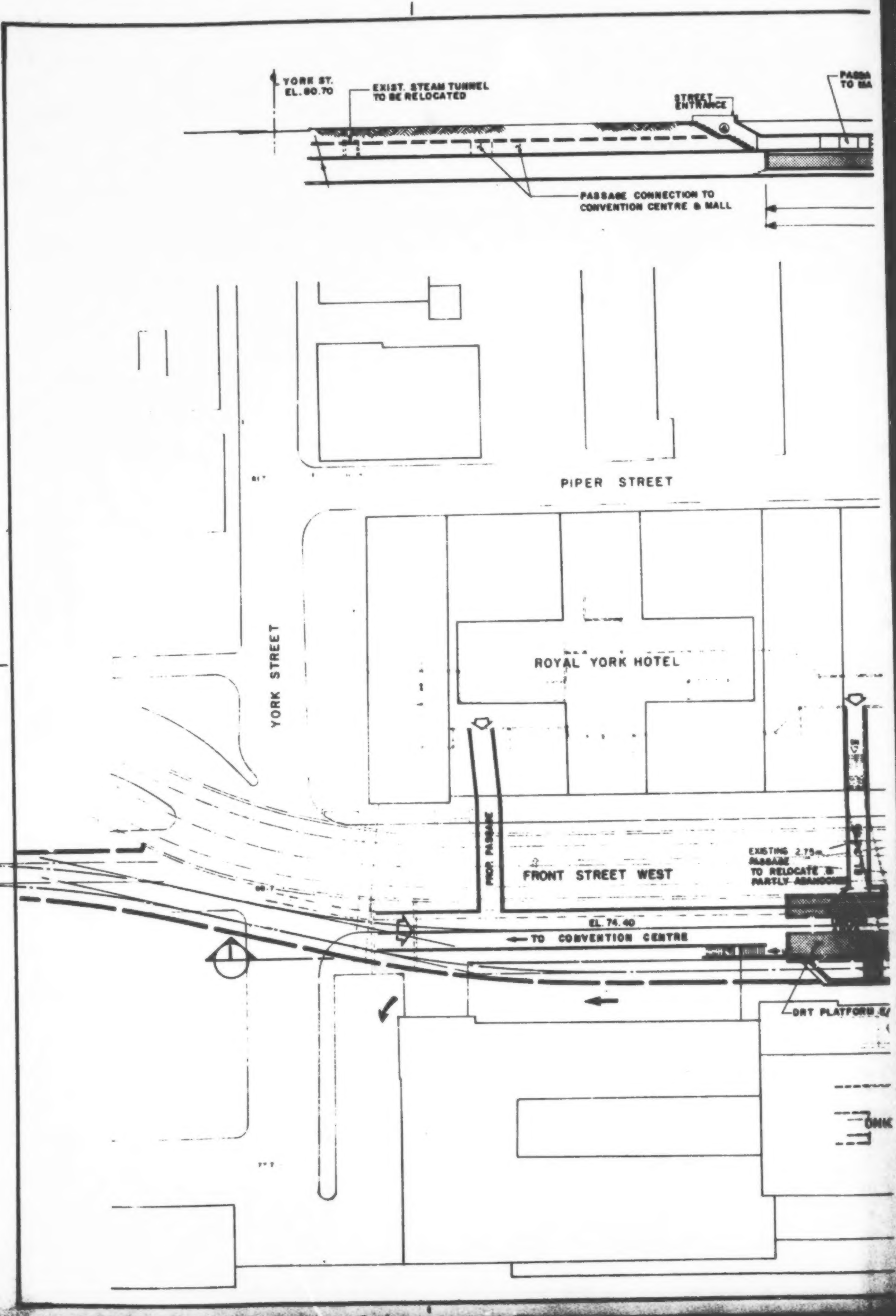
PLAN & SECTIONS

D.R.T. STATION NO. 2

DWG. NO.
0172-A-301

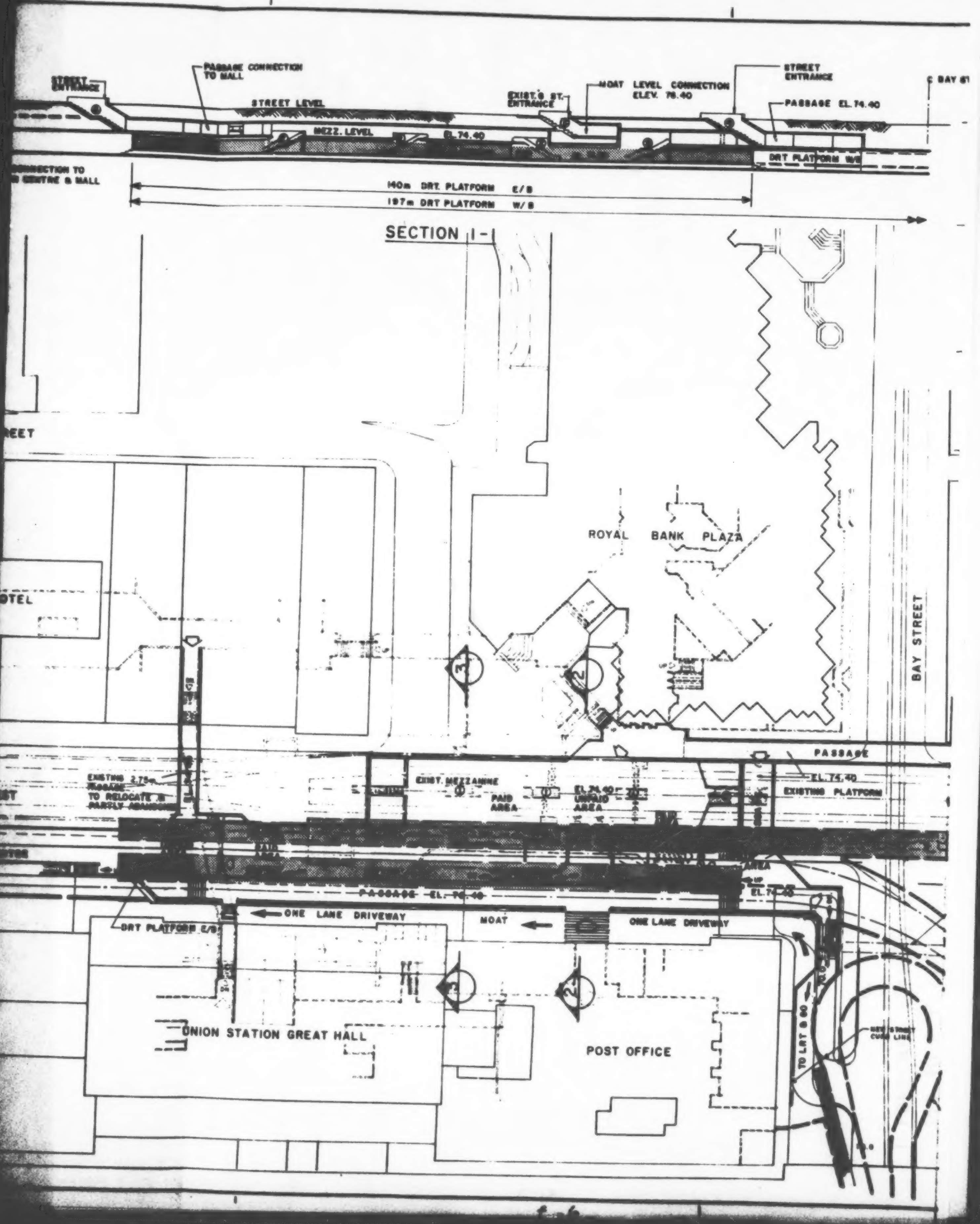
FORM 30

F-1

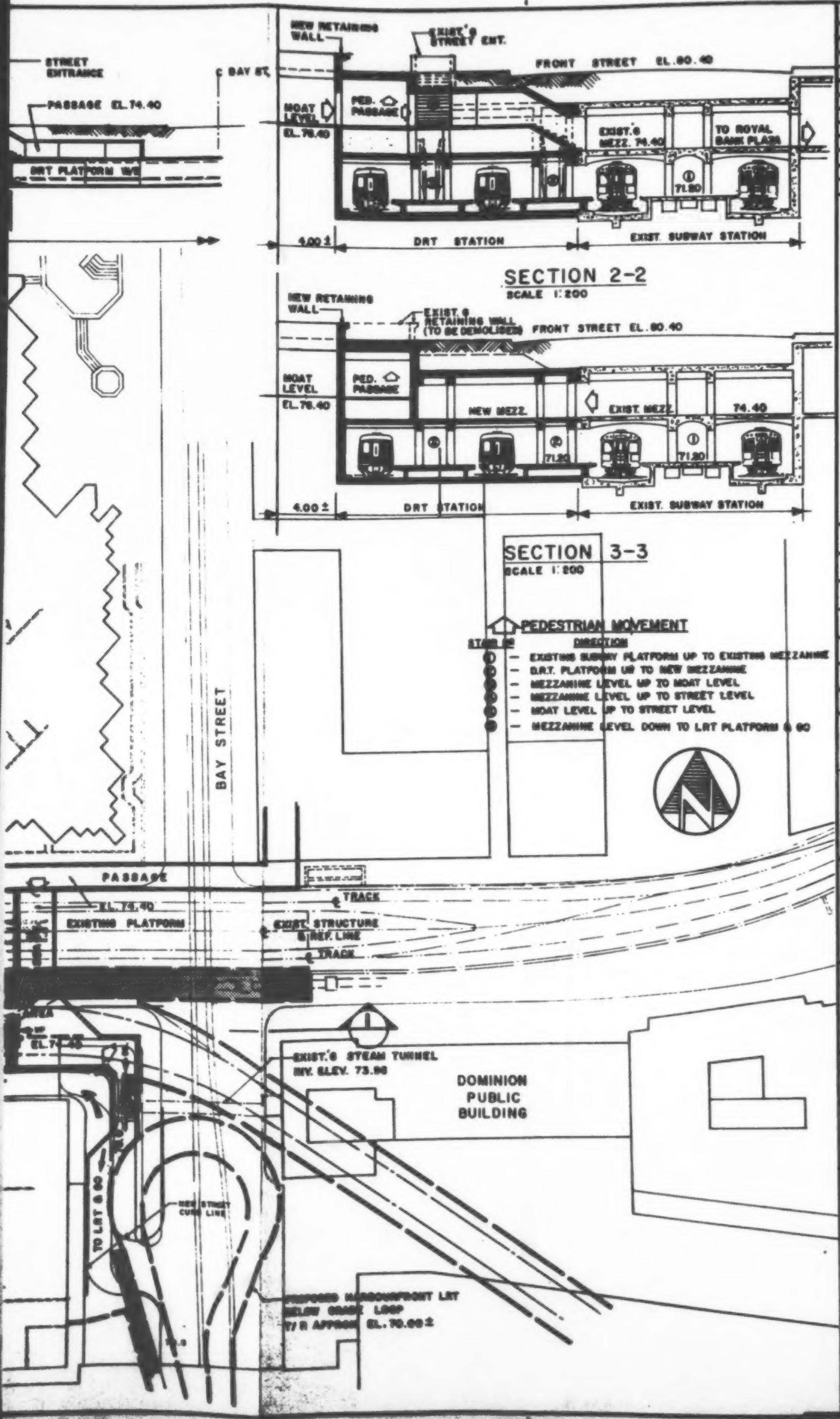

YORK ST. EL. 80.70
EXIST. STEAM TUNNEL TO BE RELOCATED
STREET ENTRANCE
PASSA TO MA
PASSAGE CONNECTION TO CONVENTION CENTRE & MALL
PIPER STREET
YORK STREET
ROYAL YORK HOTEL
PROP. PASSAGE
FRONT STREET WEST
EXISTING 2.75m PASSAGE TO RELOCATE & PARTLY ABANDON
EL. 74.40
TO CONVENTION CENTRE
1
DRT PLATFORM

SHEET No.

DRAWING No.


STREET ENTRANCE
PASSAGE CONNECTION TO MALL
STREET LEVEL
MEZZ. LEVEL
EL. 74.40
EXIST'G ST. ENTRANCE
MOAT LEVEL CONNECTION ELEV. 78.40
STREET ENTRANCE
PASSAGE EL. 74.40
℄ BAY ST
DRT PLATFORM W/B
NNECTION TO
 CENTRE & MALL
140m DRT PLATFORM E/B
197m DRT PLATFORM W/B
SECTION 1-1
REET
ROYAL BANK PLAZA
OTEL
BAY STREET
3
2
PASSAGE
EL. 74.40
EXISTING PLATFORM
EXIST. MEZZANINE
PAID AREA
EL. 74.40
UNPAID AREA
EXISTING 2.75m PASSAGE TO RELOCATE & PARTLY ABANDON
PASSAGE EL. 74.40
EL. 74.40
DRT PLATFORM E/B
ONE LANE DRIVEWAY
MOAT
ONE LANE DRIVEWAY
TO LRT & GO
3
2
UNION STATION GREAT HALL
POST OFFICE

F-3


NEW RETAINING WALL
EXIST'G STREET ENT.
STREET ENTRANCE
℄ BAY ST.
FRONT STREET EL. 80.40
PASSAGE EL. 74.40
MOAT LEVEL EL. 76.40
PED. PASSAGE
EXIST'G MEZZ. 74.40
TO ROYAL BANK PLAZA
DRT PLATFORM W/E
71.20
4.00 ±
DRT STATION
EXIST. SUBWAY STATION
EXIST'G RETAINING WALL (TO BE DEMOLISHED)
NEW MEZZ.
EXIST. MEZZ.
74.40
BAY STREET
PASSAGE
EL. 74.40
EXISTING PLATFORM
℄ TRACK
EXIST. STRUCTURE & REF. LINE
EXIST'G STEAM TUNNEL INV. ELEV. 73.90
DOMINION PUBLIC BUILDING
TO LRT & GO
NEW STREET CURB LINE
PROPOSED HARBOURFRONT LRT BELOW GRADE LOOP T/R APPROX. EL. 70.00 ±
EL. 74.40

SECTION 2-2
SCALE 1:200

SECTION 3-3
SCALE 1:200

PEDESTRIAN MOVEMENT

STAIR NO	DIRECTION
①	— EXISTING SUBWAY PLATFORM UP TO EXISTING MEZZANINE
②	— D.R.T. PLATFORM UP TO NEW MEZZANINE
③	— MEZZANINE LEVEL UP TO MOAT LEVEL
④	— MEZZANINE LEVEL UP TO STREET LEVEL
⑤	— MOAT LEVEL UP TO STREET LEVEL
⑥	— MEZZANINE LEVEL DOWN TO LRT PLATFORM & GO

REVISIONS

C.O.	
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C.O.	
C.O.	
C.O.	

HALF SIZE REPRODUCTION
SCALE ACCORDINGLY

REFERENCE DRAWINGS

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DRAWN AL. SERRANO FEB. 85
CHECKED Jan '85
CORRECT Mar '85
SCALE 0 5 10 15 20 m
1:200
AND AS NOTED

TORONTO TRANSIT COMMISSION
ENGINEERING DEPARTMENT

DOWNTOWN R/T

FRONT STREET OPTION
BELOW GRADE

UNION STATION

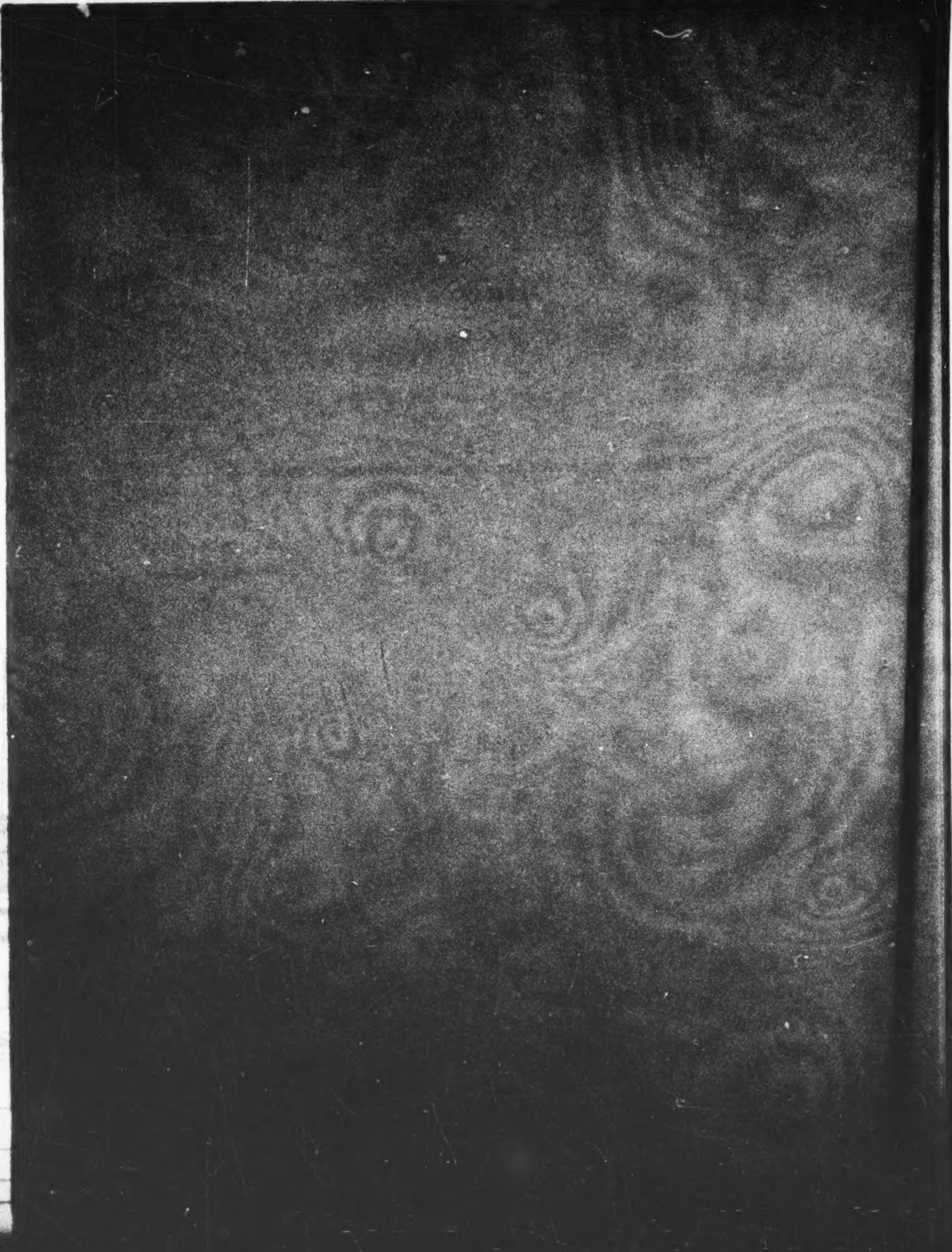
PLAN AND SECTIONS

D R T STATION No.13

DWG. NO.
0172-A-305/3

APPENDIX G

TTC Policy on Service for Transportation Handicapped



APPENDIX G

BACKGROUND AND POLICIES RESPECTING TRANSIT SERVICE FOR THE TRANSPORTATION HANDICAPPED

Handicapped and Elderly

A program of modification to the existing system is currently underway to improve accessibility for the Handicapped and Elderly. This program addresses the needs of those handicapped, such as the blind or hearing impaired, who are able to use the conventional system, though with some difficulty. It is the TTC's policy to provide a parallel service for those handicapped who are unable to use the conventional service.

Wheel-Trans, administered by the TTC and operated under contract to the TTC, provides door-to-door transportation within the Metro area in special lift-equipped vehicles. However, there are several systems in Canada and many in the United States, which have made their regular rapid transit services fully accessible to the disabled. The possibility of making the Downtown Rapid Transit line facility fully accessible has therefore been examined.

It has been determined that the cost of making the stations and vehicles of the proposed rapid transit options accessible, would be in the order of $4.5 million, less than 1% of the total cost of the line. For the reasons set out below it is considered that the handicapped would be better served by investing these funds in the parallel Wheel-Trans service. It is further suggested that the cost of making new surface and rapid transit facilities fully accessible would be an appropriate basis for the funding of capital investment in Wheel-Trans.

What Full Accessibility Means

The Commission has previously examined the possibility of making the Scarborough Rapid Transit fully accessible. Since the stations had not been designed with this in mind, the cost of the changes is proportionately higher than if the system had been built with this intention from the beginning.

The required modifications involved elevators and elevator shafts, ramps, elevator vestibules and fare collection equipment. The cost of modifications to vehicles was not addressed. For the purposes of this analysis, it has been assumed that the efficient design of stations intended to be fully accessible would substantially reduce the need for moving ramps and limit the additional costs to essentially those for elevators, elevator shafts, and vehicle modifications.

The capital cost estimate of $4.5 million is based on incorporating these features only into the new line. It does not address how the handicapped will get to the line, nor how they will continue their trip on leaving the line. They would not be able to transfer to any existing rapid transit or surface facilities unless these were also made fully accessible.

A background report on service for the disabled that was prepared for the TTC Long Range Plan, estimated the cost of converting the existing facilities to be $130-185 million for rapid transit, and $33-60 million for surface transit (1984 dollars).

Estimated Cost of Full Accessibility

The total cost estimate of $4.5 million for the DRT line includes engineering and contingency and is detailed in Exhibit G-1.

Travel Limitations

As noted above, these expenditures would enable the handicapped to use the DRT line, but existing rapid transit and surface facilities would not be accessible. It can be argued that one could continue the trip via Wheel-Trans whether or not other facilities were made accessible, and that making new lines accessible is a start toward full system-wide accessibility. An APTA report addressing the mobility needs of the elderly and handicapped noted that multi-modal services (combining access to regular services with parallel services) are few "because of the general preference for the single mode, the need to avoid the inconvenience of transfers and the complexity of service integration". The latter point is an important consideration. It may in fact be impractical to combine a regular service with a demand-responsive one. System delays on either service might leave a handicapped patron stranded for a considerable time.

Due to crowding and headways, it would be difficult and possibly unsafe for wheelchair handicapped to use a fully accessible system during the rush hours. It would be difficult to manoeuver through a crowd to one of the spots designated for wheelchairs and secure the wheelchair before the train started again. If the wheelchair was not secured it could be unsafe for both the handicapped partron and other patrons. When full accessibility to the Scarborough Rapid Transit was studied previously, it was felt that unless wheelchair passengers were able to enter the car and secure the necessary hold-down devices without assistance, they would have to be accompanied by an attendant. It was not considered practical to have the operator of the car provide assistance in this area and thereby delay the service. Operating staff still feel that an attendant must accompany certain wheelchair passengers, and that their use of the line would increase dwell time at stations.

It would appear that meeting the requirements of both the handicapped and those who are not handicapped, results in a system which is ideal for neither. Trains would have a longer dwell time at stations in order to permit the handicapped to board and secure their wheelchairs, and the presence of other patrons could be an obstacle to completing this task.

Experience Elsewhere

It is worth noting that those systems which have been made fully accessible are not well utilized by the handicapped. This is particularly evident in the United States where many bus systems have responded to a 1979 Federal regulation requiring half of peak-hour buses to be equipped with lifts. Another APTA report on the cost effectiveness of transportation services for the handicapped, states that "in order for the cost per lift user to equal that for a high cost specialized transportation service, an accessible fixed-route bus system would have to average close to 0.56 lift boardings per day per lift-equipped bus. The highest lift utilization rate attained thus far is 0.33 lift boardings per day per lift-equipped bus by Seattle Metro. No other large or medium sized transit property has come close to Seattle's lift-use rate".

Rapid Transit systems in Edmonton, San Francisco and Washington have been made fully accessible. Only two or three wheelchair passengers per week were using the Edmonton LRT system when it was surveyed in 1978. Recent contact with

Edmonton confirms that the system continues to experience low usage due to the presence of the more convenient parallel system. San Francisco, where 58 elevators serve 34 stations, has experienced ridership by wheelchair passengers of 200 per day. Washington, with 92 elevators at 44 stations, reports usage by about seven wheelchair passengers per day. It is reasonable to expect usage to be higher in cities with a favourable climate since wheelchair patrons can get to and from the stations with less difficulty.

Cost Effectiveness

There are essentially three options for providing transportation services to the elderly and handicapped:

- Fixed-route accessible services (i.e. making regular public services accessible),
- Demand-responsive (door-to-door) services in specially equipped vehicles, or
- Multi-modal services (a combination of the first two).

Studies elsewhere support the recommendation of this report; that capital resources would be better utilized in upgrading the demand-responsive parallel system.

The Hickling-Partners report, "A Review of Urban Transportation Services for the Disabled Persons", states that "from the evidence presented and for Canadian conditions, the most cost effective option is a combination of inexpensive adaptations to buses, supplementary demand-responsive services, subsidized taxi services for some disabled persons, and the provision of capital assistance to some severely disabled persons to purchase specially adapted automobiles".

Studies completed by Alberta Transportation have shown that a good paratransit system is more effective than regular transit in eliminating travel barriers for disabled persons. It is more cost effective to provide a parallel service than to retrofit an entire fleet of buses for full accessibility.

A U. S. Congressional Budget Office study rejected the view that retrofitting the existing fixed-route transit systems would be cheaper in the long run. The cost effectiveness measures computed by the CBO showed that, from a national perspective, the strategies emphasizing door-to-door service would have a substantially lower cost per trip than the strategy emphasizing modifications of existing fixed-route bus and rail systems.

Upgrading the Parallel Service

In 1984, Wheel-Trans carried 35,000 passengers a month and operated more than 3,000,000 miles of revenue service. There are now approximately 12,000 registered users and the list is growing by about 300 per month.

Requests for service average about 1,300 per day and about 1,100 of these are served. One APTA report notes that although the transportation handicapped do not travel very often, their latent demand for additional travel appears to be very low. This would suggest that Wheel-Trans is probably meeting most of the demand for service, and a reasonable expansion would enable it to meet all service requests.

Wheel-Trans' present vehicle fleet consists of 62 large and 22 small (station wagon) vehicles. The large Thomas Mighty Mite vehicles are scheduled to be replaced over the next several years with the new Orion II produced by Ontario Bus Industries. The Orion will cost $93,000 per vehicle.

An additional 48 Orion vehicles could be purchased for the capital required to make the new line fully accessible. This would increase the existing capacity of Wheel-Trans by 57%. Additional funding, however, would be required to cover increased operating costs.

EXHIBIT G-1

CALCULATION OF CAPITAL ESTIMATES FOR FULL ACCESSIBILITY TO DOWNTOWN RAPID TRANSIT LINE

(1984 Dollars)

COSTS PER STATION

Elevator	$ 135,000	each
Shaft	$ 145,000	each
	$ 280,000	
	X 2	Elevators per station
Total Cost Per Station	$ 560,000	

TOTAL STATION COSTS

Downtown Rapid Transit (Danforth to Spadina)	7 stations	$3,920,000

COST PER VEHICLE

The cost to provide three fold-up seats and straps to secure the wheelchair in place is estimated to be $10,000 per vehicle.

TOTAL VEHICLE COSTS

Downtown Rapid Transit ICTS (22m long)	54 vehicles	$ 540,000

TOTAL COSTS

Stations and Vehicles	$4,460,000

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